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INTUSSUSCEPTION

A Comparison of the Infant and Adult Types*

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INTUSSUSCEPTION is regarded generally as a condition peculiar to infancy and early childhood. Bonetus,[1] who is accorded with having reported in 1700 the first operation for intussusception, found the condition, however, in an adult female. The second recorded case, reported in 1751 by Velse,[2] was performed under the supervision of Nuck in a 50 year old female. In one of the earliest surveys of the literature concerning the problem of intussusception in adults, Eliot and Corscaden[3] in 1911 found, in one tabulated list of 115 cases compiled in a general hospital over a twenty-five year period, that about 10 per cent of these occurred in adults over fifteen. This report they considered as representative, and used it to support their argument that intussusception in adults, while uncommon, occurs with sufficient frequency to warrant a careful consideration in the literature, in which the problem had been universally neglected. Treves,[4] in his classic monograph on intestinal obstruction in 1884, noted the even higher incidence of 35 per cent of all cases of intussusception in adults over twenty-one. Iason,[5] however, in a recent study has shown that approximately 5 per cent of all cases occur in adults. This more conservative estimate of the frequency with which intussusception occurs in adults, however, has not been reflected in the attention accorded the matter in the recent literature.

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There is no significant difference in the course that intussusception takes as it occurs in the adult or in the child. There are, however, differences in the two situations with regard to cause, location, symptoms, management, and prognosis.

In the infant a definite causative factor cannot be determined usually. Ladd and Gross,[6] in a study of 372 successive cases at Children's Hospital, Boston, were able to explain the cause of intussusception in only 5 per cent. In the adult, however, in most cases, sufficient evidence is found at the time of operation to explain the development of the intussusception. A tumor, benign or malignant, is the factor most frequently reported. In the series of Eliot and Corscaden,[3] tumors were found in 100 of the 300 cases studied. The tumor was benign in 60 cases, and, of this type, the majority originated in the inner layers of the intestinal wall and had constricted or pedunculated bases. Writing of submucous lipoma of the gastrointestinal tract, Stetten[7] reported that, in 43 per cent of 67 cases of intestinal lipoma, intussusception had occurred. Schottenfeld[8] has reported 275 cases of submucous lipoma, of which number 36 per cent produced intussusception. Lazarus and Marks[9] noted in their report on submucous lipoma of the colon the incidence of intussusception in 45 per cent of their cases. Poston,[10] Botsford and Newton,[11] and others have reported on the association of intestinal lipoma with intussusception. Clifton and Landry[12] reported the occurrence of intussusception in 33 of 45 cases of fibroma of the intestine.

Other conditions which have been found to produce intussusception in the adult are: typhoid ulcer, tuberculous ulcer, dysentery, acute appendicitis, Meckel's diverticulum, congenital ileal band, foreign body, or sudden radical dietary change.[5] Among adults, as well as among children, there is a large percentage of cases for which no apparent cause can be determined. Recent authors have reported a number of cases in which there was apparent spontaneous development of intussusception. Although percentages are not available, there are significantly fewer cases of sudden onset in adults than in infants.

There are four basic types of intussusception:[13] 1) colocolic, in which only the colon is involved, 2) ileoileal or enteric, in which one part of the small intestine is invaginated into another, 3) ileocecal, in which the ileocecal valve is prolapsed into the cecum drawing the ileum behind it and appearing then at the apex of the intussusception, and 4) ileocolic, in which the ileum prolapses through the ileocecal valve into the colon. Other types are retrograde invagination and jejunogastric intussusception following gastroenterostomy or gastric resection.

In Kahle's series[13] of 151 cases, there were 88 patients under 2 years of age, 32 between 2 and 16, and 28 patients over 16.* A relationship to be noted in this series is that of age to the given location of the intussusception. Among both adult and infant cases, the ileocecal or ileocolic type of intussusception occurred most frequently. Fifty-nine per cent of the infantile cases, 47 per cent of the intermediate cases, and 36 per cent of the adult cases were of the ileocecal or ileocolic type. However, only 8 per cent of the infantile cases, 9 per cent of the intermediate group, as compared with 32 per cent of the adult cases, were of the enteric type. Three per cent of the infants, 16 per cent of the intermediates, and 11 per cent of the adults had colocolic intussusception. Recurrent intussusception was present in 3 per cent of the infants, 12.5 per cent of the intermediates, and 25 per cent of the adults. This distribution is a significant one, as it seems to point to the increased frequency of neoplasms as the causative factor in the intermediate and adult groups.

The symptoms of intussusception in the infant appear generally quite characteristic and fulminating. In the adult case, however, the symptoms may be vague, and the onset is usually gradual. Iason[5] has noted that in adults there are often signs of mild recurrent obstructions associated with symptoms of the provoking cause. Frequently, there is colic-like abdominal pain, nausea, vomiting, obstipation, and passage of blood in stools. These symptoms, similar to those in the child, do not, however, occur with the same constancy among adults. Tenderness over the involved area does not appear as a common symptom, due to the fact that the intussuscipiens affords a protecting sheath between the intussusceptum and the parietal peritoneum. Although an abdominal mass is palpated in many instances, the frequency with which it is found varies with the location of the intussusception. Ladd and Gross[6] noted a palpable abdominal mass in 84 per cent of the children in their series. In relatively few cases of enteric intussusception, however, found more frequently in adults, is the abdominal mass felt. Iason[5] noted in the adult that the abdomen is not characteristically distended in the early stages, although it usually becomes so as the obstruction progresses.

It is considered generally that immediate surgery is indicated for all adult patients, as well as for all infantile cases. An analysis of mortality statistics in Kahle's series,[13] however, shows that immediate surgery for the adult is not as important as it is for the child. Excluding consideration of cases of recurrent intussusception, one

*The age was not stated in three cases, nor was there sufficient information on all to allow an adequate classification.

may note the relationship of duration of symptoms and mortality rates as this relationship affects the two age groups. The mortality rate for infants in whom surgery was undertaken within 24 hours of the onset of symptoms was 57 per cent, 85.7 per cent at 24 hours, and 100 per cent if operation was deferred over 24 hours. In the adult group there were no deaths in patients who were operated upon within 48 hours, and 7 of 10 died when operation was deferred for over 72 hours.

Performing additional surgical procedures at the time of operation for intussusception is not recommended. In Kahle's series,[13] in which the appendix was removed at the time of operation in 43 cases, 13 patients died. Although a Meckel's diverticulum is often associated with intussusception, mortality statistics indicate that it is inadvisable to attempt this additional procedure unless there is associated gangrene. The removal of a tumor causative of intussusception is considered a different matter. A tumor was excised in four instances in Kahle's series[13] without a fatality.

This review comprises a study of 65 cases, infant and adult, of intussusception seen at Henrietta Egleston Memorial Hospital, Grady Memorial Hospital, and Emory University Hospital.

Forty patients were infants under one year of age. All types of intussusception as to location were represented. Recurrent intussusception was present in 3, and, in each of these cases, a tumor was the causative factor.

There were, in all, 6 patients with tumors producing intussusception. A submucous lipoma was found in 2; an adenomatous polyp in 2; and a benign fibroma in 2. In 5 cases a Meckel's diverticulum was found and diagnosed as the factor producing intussusception. These cases will be reviewed in detail in the reports which follow.

The most frequent symptom found in all cases was acute abdominal pain. The presence of an abdominal mass was noted in 23 cases. The extrusion of the bowel through the rectum was encountered in 4.

Of the 65 cases, 53 received operative treatment with a mortality rate of 11.3 per cent. Appendectomy was performed in 8 cases, because the appendix was found to be associated with the intussusception, or because it was thought safe to carry out the procedure.

Twelve patients did not receive operative treatment, either because of their general condition, or because reduction took place while the diagnosis was being made. In two cases the patients experienced extreme shock, and a reduction or removal of the intus-

susception was not deemed feasible. Neither of these patients survived. There were, in all, 5 mortalities in the group, or a mortality rate of 41.6 per cent. During fluoroscopic examination, reductions occurred in 5. In some the reduction took place easily, although in others it was achieved with some difficulty. This procedure is not routinely advocated, because the condition of the intestinal wall is not known even after reduction, and there is the possibility that non-viable intestine may have been left. The possibility of perforation from vigorous manipulation is also of considerable danger.

The 11 reports which follow are of cases for which a definite causative factor was found.

CASE 1. E. B., a white woman, aged 48, was admitted to Emory University Hospital on Feb. 1, 1949, with a history of increasing constipation and a dull aching pain of one month's duration in the left lower quadrant. Two weeks before admission, the pain in the left lower quadrant had become severe and was accompanied by nausea and vomiting. Three days before admission, the pain had become intense and had radiated to the back. On administration of an enema, a black, jelly-like material was returned. Subsequent bowel movements contained clots of bright red blood.

On physical examination the abdomen was not found to be distended. There was moderate tenderness on deep palpation over the left lower quadrant. An elongated mass was palpable at the level of the left iliac crest. Peristalsis was hyperactive, and there was an associated metallic tinkling.

A Miller-Abbott tube was passed into the intestine, and suction was instituted. On the third hospital day an exploratory laparotomy was performed, in which the colon was found to be dilated proximal to the splenic flexure. A transverse colostomy was performed proximal to the obstruction. Through the use of barium enema on the seventh hospital day, the complete obstruction of the descending colon at the level of the iliac crest was demonstrated, and a polyp was shown. It was the impression of the radiologist that the polyp was causing the intussusception.

Recurrence of the abdominal pain was noted on the tenth hospital day, and a left lower quadrant mass was again felt. A second abdominal exploration was done on the fifteenth hospital day, and a mass was found at the splenic flexure. No intussusception was present at the time of operation. The portion of colon containing the tumor was resected, and an end-to-end anastomosis was performed.

On histologic examination the tumor was found to be a submucous lipoma.

CASE 2. J. L., a white man, aged 51, was admitted to Grady Memorial Hospital on July 20, 1949. Approximately 10 months prior to admission he had first noticed symptoms of abdominal disease, and was hospitalized in November, 1948, because of jaundice and pain in the right upper quadrant. Cholecystograms at this time revealed a non-functioning gallbladder with opaque calculi. Following conservative treatment, he was discharged after being asymptomatic for over a week. In April, 1949, following an attack of cramping right upper quadrant pain and diarrhea, with stools containing blood and mucus, the patient was readmitted to the hospital, and a tentative diagnosis of amebiasis was made. Since laboratory studies showed negative

evidence, a laparotomy was performed. Several adhesive bands were found in the right lower quadrant, and one of these, which was causing some obstruction to a loop of ileum, was released. A Meckel's diverticulum was found also and removed. The patient did well postoperatively and was discharged. Shortly thereafter, however, his former symptoms recurred, and nausea with occasional vomiting was experienced also. By July, 1949, these symptoms had become accentuated, and he was again admitted to the hospital.

On physical examination no masses could be palpated in the abdominal region, but a response of constant tenderness in the right side of the abdomen and right flank was received on fist percussion. Roentgenographic study revealed an ileocolic intussusception which was not reduced by the barium enema.

A second laparotomy was performed on August 3, and the intussusception easily reduced. A small tumor was identified as the leading point of the intussusception. An eight-inch segment of ileum containing the tumor was resected and end-to-end anastomosis performed in two layers.

Histologic examination revealed the tumor to be a submucous lipoma.

CASE 3. E. E., a white man, aged 44, was admitted to Emory University Hospital on Jan. 28, 1947, with the complaint of intermittent attacks of cramping abdominal pain and vomiting, which had gradually increased in severity over a period of three months. Vomiting occurred usually after meals, bringing subsequent temporary relief from abdominal pain. Stools were constipated, but without blood or mucus.

On examination the abdomen was found to be slightly distended and tympanitic. Peristalsis was active, and no masses were felt. Roentgenograms demonstrated small bowel obstruction, however.

A laparotomy was performed three days after admission by Dr. J. C. Read. A tumor about the size of a golf ball was found in the upper ileum, and there was an ileoileal intussusception. Approximately 12 to 15 cm. of small intestine was resected, and a side-to-side anastomosis was performed. Histologic examination revealed the tumor to be a fibroma of the wall of the jejunum. No evidence of malignancy was present.

CASE 4. M. D., a Negro man, aged 41, was admitted to Grady Memorial Hospital on March 5, 1943, with complaint of the acute onset of cramping abdominal pain with vomiting eight days prior to admission. The pain, localized in the lower abdomen, recurred every 20 to 30 minutes. Constipation, alternating with diarrhea, developed on the day prior to admission. Stools were not bloody.

On examination the abdomen was not found distended. A mass approximately the size of a large orange was palpable in the right lower quadrant. Following administration of a barium enema, an intussusception was noted which was partially reduced under fluoroscopy.

On the fifth hospital day an exploratory laparotomy was performed, during which the cecum was found to be filled with an elongated mass. A tumor approximately 4 cm. in diameter was palpated at the apex of the intussusception. Since reduction could not be accomplished, a portion of the terminal ileum, the cecum, and the ascending colon were resected, and end-to-end anastomosis was performed.

The tumor, which was attached to the ileal wall with a pedicle, was smooth and firm. Histologic examination revealed an extremely cellular fibroma.

CASE 5. H. C., a white boy, aged 2½ years, was admitted to Henrietta Egleston Hospital on March 30, 1949, six weeks after the onset of protrusion of a mass from the rectum during defecation. During this period there were episodes of severe cramping abdominal pain. Blood and mucus appeared in his stools in increasing amounts.

On admission the child was in no apparent distress. Physical findings were negative, except for a high indefinite mass felt on rectal examination.

An exploratory laparotomy was performed by Dr. Lon Grove on the day following admission. A marble-shaped polyp was found in the sigmoid. No intussusception was present at the time of operation. The polyp was excised and, on histologic examination, was found to exhibit rapid growth, although there was no definite malignant change. The postoperative course was uneventful.

CASE 6. H. H., a white girl, aged 5½ years, was admitted to Henrietta Egleston Hospital on June 27, 1933, following the onset eight days prior to admission of diarrhea followed by cramping abdominal pain. Until the day preceding admission gradual improvement seemed to be occurring, when episodes of severe abdominal pain, lasting from one to two hours, were again noted. There were frequent loose bowel movements, but no vomiting. Past history revealed the presence of a palpable abdominal mass at the age of 5 months.

The child appeared acutely ill on admission. The abdomen was rigid, but there was no significant tenderness. A mass approximately the size of a small orange was palpated in the right upper quadrant.

A laparotomy was performed on the night of admission. An easily reducible intussusception was found in the transverse colon. Following reduction, a mass with a broad base was found that almost filled the cecum. Enlarged mesenteric nodes were present. The cecum and terminal ileum were resected, and a side-to-side anastomosis between the ileum and hepatic flexure of the colon was performed. Histologic examination of the specimen revealed it to be an adenomatous polyp with no evidence of malignancy.

CASE 7. C. B., a white boy, aged 7 months, was admitted to Henrietta Egleston Hospital on Feb. 20, 1933, following the onset of vomiting the day preceding admission. Vomiting had persisted and was soon followed by frequent, loose bowel movements which showed evidence of a small amount of blood. Soon after onset the infant's mother noted a mass in the right upper quadrant.

On physical examination marked dehydration was noted, and the infant appeared to be in considerable pain. The abdomen was tense, with tenderness most marked in the right upper quadrant. A sausage-shaped mass approximately 7.5 cm. in length was palpated in this area. A laparotomy was performed on the day after admission. An intussusception was found in which the terminal ileum had slipped into the cecum, and the cecum in turn had invaginated into the ascending colon. A Meckel's diverticulum was present also.

The intussusception was reduced with difficulty, and the diverticulum was removed. An enterostomy was done through the stump of the diverticulum. The circulation in the terminal ileum was impaired, but it appeared that the infant could not stand a radical resection; accordingly, the loop of damaged bowel was returned.

The postoperative course was satisfactory for two days. Abdominal distention was then noted. The infant's condition became progressively worse. Death occurred on the third postoperative day. Autopsy revealed localized peritonitis, paralytic ileus, and dilatation of the stomach and intestines.

CASE 8. H. V., a white boy, aged 6 months, was admitted to Henrietta Egleston Hospital on June 11, 1945, which was three days after the onset of severe pain and rigidity of the abdominal muscles. Vomiting had begun several hours after the onset of these symptoms, and bowel movements had ceased. An enema administered at this time had brought a blood stained stool. The infant's temperature on the day preceding admission was 103° F. by rectum. The infant had a convulsion on the day of admission.

On physical examination the skin was found pale and clammy. The pulse rate was rapid, and the infant was unresponsive. The abdomen was markedly distended and tympanitic. A mass could not be felt because of the distention. Laboratory studies revealed a white cell count of 13,850, and hemoglobin concentration was 60 per cent.

A Miller-Abbott tube was inserted and suction applied. The general condition of the patient improved with relief of the distention. On the twelfth hospital day, however, there was temperature elevation and the condition of the patient became suddenly poor. Death occurred on the following day.

Autopsy revealed a Meckel's diverticulum to have been causative in producing the intussusception. There was perforation of the terminal ileum with an associated peritonitis.

CASE 9. M. W., a white boy, aged 10 months, was admitted to Henrietta Egleston Hospital on Jan. 13, 1939, three days after the onset of abdominal discomfort and vomiting, following a large liquid stool. No further bowel movements occurred until the day of admission, at which time a large blood clot was passed in a stool.

On physical examination the infant appeared listless, pale, and dehydrated. The abdomen was distended, and there was tenderness on deep palpation in the left lower quadrant. No abdominal mass was felt.

A barium enema was administered, and the intussusception was thought to have been reduced under fluoroscopic observation. However, vomiting persisted on the following day, and a mass was palpated in the abdomen. Accordingly, an exploratory laparotomy was performed, which revealed a Meckel's diverticulum at the apex of the intussusception which had reached as high as the hepatic flexure of the colon.

The intussuscepted bowel appeared quite blue and cyanotic, but the infant's condition prevented resection. The infant's condition remained stormy for the first three postoperative days, after which time recovery was normal.

CASE 10. C. W., a white boy, aged 14, was admitted to Grady Memorial Hospital on Feb. 13, 1945, complaining of acute abdominal pain that had persisted for about six hours. The pain was reported as being generalized, sharp, non-radiating, and colic-like. Nausea and vomiting had developed an hour after the onset of the pain.

On physical examination the abdomen was found soft, with a point of maximal tenderness immediately to the right of the umbilicus. Roentgenographic

examinations revealed distended loops of intestine thought to be produced by intestinal obstruction.

Laparotomy was performed on the second hospital day, and an ileocecal intussusception with a Meckel's diverticulum at its apex was found. Attempts at reduction being unsuccessful, it was necessary to remove approximately 20 cm. of involved intestine, followed by side-to-side anastomosis. The postoperative course was uneventful.

CASE 11. J. B., a white boy, aged 9 months, was admitted to Grady Memorial Hospital on Aug. 13, 1944, with a history of bloody stools for an unaccounted length of time.

An exploratory laparotomy was performed soon after admission. A Meckel's diverticulum was found at the apex of an intussusception which had progressed to the midportion of the descending colon. A 30 cm. segment of bowel appeared gangrenous after reduction. This portion of the bowel was resected, and a side-to-side anastomosis performed.

The infant became cyanotic on the first postoperative day and died. An autopsy was not performed.

SUMMARY

A discussion of the essential differences in intussusception as it occurs in the adult and in the infant is presented.

Sixty-five cases of intussusception seen at Henrietta Egleston Memorial Hospital, Grady Memorial Hospital, and Emory University Hospital are reviewed. Detailed case studies are given for six in whom a tumor was found to have produced the intussusception, and five in whom there was a Meckel's diverticulum.

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TRANSTHORACIC RESECTION OF THE ESOPHAGUS AND STOMACH FOR CARCINOMA

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THE principles basic to modern management of esophageal and proximal gastric carcinoma have become established only in the past decade and represent but part of the phenomenal progress made in surgery of the thorax during this period. Correctly, they should be referred to the original work of Adams and Phemister[1] in this country and of Ohsawa[2] in Japan. Currently it is accepted that these tumors should be radically resected, bowel continuity being established by some form of esophagogastric or esophagojejunal anastomosis, or if impossible of resection, the tumor obstruction should be by-passed via an esophagogastric or esophagojejunal shunt. Local tumor residuals and apparent metastases do not necessarily preclude the use of palliative resection. Patients with esophageal and proximal gastric carcinomas should be offered a one-stage resection with hope for cure or palliation, or they should be relieved of starvation by an internal shunt. If neither be possible, one is occasionally justified in the use of so-called palliative, permanent gastrostomy. The Torek procedure[3] and its complemental, multistage, ante-thoracic reconstruction is no longer indicated. These views have been variously emphasized in several recent reports.[4,6]

This paper concerns the writer's personal experiences with 50 consecutive patients suffering from carcinoma of the esophagus and proximal stomach. These observations have been made during the period between January 1946 and July 1949. Obviously many of these patients have been managed so recently as to preclude significant consideration of final results.

As indicated in Table I carcinoma of the esophagus is a disease of older individuals. Our youngest patient was 52 years of age and over two third of these tumors were observed in persons past 60. Carcinoma of the stomach occurs in approximately the same age groups except that younger individuals are also affected, our youngest patient being a 26 year old girl. The predominance of males in this series, 7:1 for esophageal carcinoma and 3:1 for gastric carcinoma, parallels closely the experience of others.

Patients with carcinoma of the esophagus, regardless of tumor type, present remarkably similar histories. The typical patient first

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Seven of the patients in this report were operated on at the University of Chicago Clinics.

TABLE I

Age and Sex of Patients

Those with Esophageal Carcinoma	
50-59	11
60-69	16
70-79	6
80-	1
Total	34
Males 30 Females 4	
Those with Gastric Carcinoma	
20-29	1
30-39	1
40-49	2
50-59	3
60-69	7
70-	2
Total	16
Males 12 Females 4	

experiences a fleeting sense of obstruction to the passage of a solid bolus of food through the chest. This is early associated with retrosternal distress which spontaneously disappears as the food is felt to pass the point of obstruction. With repetition of these sensations the diet is soon restricted to soft and liquid foods; however, within a few weeks even soft foods begin to pass with difficulty and regurgitation may be necessary for relief. The regurgitated material is recognizable as undigested food and, since gastric juice and bile are absent, the patient usually remarks that it does not have a bitter taste. After a few months even liquids are not tolerated. Then begins a rapidly progressive decline characterized by loss of body substance, dehydration, hypoproteinemia, avitaminosis, and anemia. The untreated patient survives only a few weeks after this.

TABLE II

Duration of Symptoms

Less than 1 month	1
1-2 months	7
3-5 months	13
6-8 months	12
9-12 months	5
Over 12 months	12
Total	50

Because of the proximal stomach's large caliber, tumors of this region may remain asymptomatic for many months, though usually

intermittent, slight irregularities in digestion are observed. Often the tumor bleeds before invasion of the cardia and lower esophagus takes place. With involvement of these latter areas the clinical picture of carcinoma of the esophagus is accurately reproduced. Except for obvious evidence of malnutrition and dehydration the patients in this series were free of physical signs of their disease except for three of the sixteen with carcinoma of the stomach in whom a mass was palpable high in the left side of the abdomen. This in spite of the fact that, as indicated in Table II, three fifths of them had had symptoms longer than six months and one fourth for more than one year. It is a sad commentary on our profession that these common tumors, which early cause the patient to seek medical assistance, remain undiagnosed for so long. Many of our patients had their first radiologic study when obstruction was almost complete. In the presence of diagnostic symptoms, three of these patients were subjected to thyroidectomy, prostatectomy, and uvulectomy respectively.

Fig. 1. Large carcinoma of the lower third of the thoracic esophagus producing marked obstruction and moderate dilatation of the proximal esophageal segment.

In addition to complete history, physical examination, and routine laboratory work, including total and fractional estimation of the plasma proteins, a considerable effort is made to determine cardio-

vascular and pulmonary reserve, degree of malnutrition and dehydration, and the presence of coincidental disease. Observed defects are intensively treated before operation. Whole blood, plasma, parenteral fluids and vitamins are generously administered. Each patient is carefully studied radiologically, and with few exceptions esophagoscopy and biopsy are performed. All patients with tumors above the lower third of the esophagus are examined bronchoscopically. Figures 1, 2 and 3, typical for this series, stand as mute testimony to the advanced stage of the disease we have been forced to treat. In Figure 1 the tumor had attained tremendous size. In

Fig. 2. Small, annular carcinoma of the esophagus at the level of the aortic arch. Long-standing obstruction is evidenced by marked esophageal dilatation proximal to the tumor.

Figure 2 the tumor, though small, has been present for a long time as is indicated by marked dilatation of the proximal esophageal segment. In Figure 3 a huge polypoid tumor of the proximal stomach has finally invaded the lower esophagus.

Because food-passageway obstruction quickly causes a fatal termination in the untreated patient we have recommended surgery to all but one man in this series. He presented a carcinoma of the upper thoracic esophagus with paralysis of the left vocal cord, paralysis of the left diaphragm, and radiologic evidence of marked enlargement of the superior mediastinum. He is included, though

some reasonable doubt exists concerning the primary origin of this tumor in the esophagus. The desperate plight of these patients is indicated by the observation that only two refused operation.

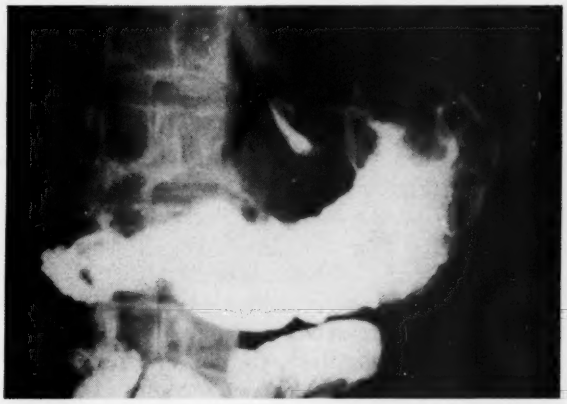

Fig. 3. Characteristic negative shadows cast by a large, polypoid carcinoma of the proximal stomach with invasion of the lower third of the esophagus.

A variety of anesthetic agents and technics have been employed; however, most of these patients have received closed, endotracheal, cyclopropane and oxygen anesthesia after induction and intubation with pentothal. Curare has often been used to facilitate intubation and to quiet the operative field at critical points. All patients have been operated on in the right lateral recumbent position and the chest entered through the bed of either the resected eighth or ninth rib, depending on the location of the tumor which in this series has been predominantly in the mid-thoracic esophagus (Table III).

TABLE III

Location of Tumors

Upper third of esophagus	3
Middle third of esophagus	23
Lower third of esophagus	8
Stomach invading esophagus	12
Stomach only	4
Total	50

Additional exposure is obtained by resection of two centimeter long posterior segments of a variable number of superior ribs. The incision is extended by division and ligation of the intervening intercostal structures. After left phrenic emphraxis the inferior pulmonary ligament is divided, the mediastinal pleura incised, and the

esophagus mobilized from the diaphragm to well above the level of the tumor, care being taken to include in the specimen all suspicious tissues. Often with right lateral extension of the tumor the right mediastinal pleura is resected, thus opening both pleural cavities. With the esophagus mobilized the diaphragm is incised radially from its lateral origin through the esophageal hiatus. The spleen is removed to facilitate dissection of the left upper retroperitoneal space. The omental vessels are divided between clamps and ligated to allow mobilization of the stomach, care being taken to preserve the right gastric and right gastro-epiploic vessels and the arcade of the greater curvature. The stomach is then delivered into the wound. With esophageal tumors, after division and ligation of the left gastric artery in the retroperitoneal space, only the proximal one fifth of the stomach and the left gastric lymph node complex are included in the resection. With gastric tumors most or all of the stomach is resected together with adherent structures such as the left lobe of the liver, the tail and/or body of the pancreas, the left adrenal, and/or the mesocolon. The distal line of transection of the bowel is determined and incision made between a proximal Payr and a distal, rubber-shod, intestinal clamp. The distal gastric or duodenal stump is closed with two rows of continuous 00 chromic gut. The gauze-covered proximal end is used as a retractor during the first stage of the anastomosis. In those instances when the specimen must be pulled under the aortic arch, the Payr clamp is released and the end of the stomach covered with a rubber sheet. The distal gastric segment, or with total gastrectomy the first loop of jejunum, is then herniated into the chest and aligned with the back wall of the esophagus proximal to the tumor. A posterior row of interrupted 000 silk sutures is next placed. Bleeding from the esophagus is prevented by tape-ligation proximal to the anastomosis after which the complete thickness of the posterior esophageal wall is incised together with the anterior wall of the stomach or jejunum. An internal, posterior row of through-and-through, interrupted sutures of 000 silk is next established after which amputation of the esophagus is completed. The anastomosis concludes with the placement of an internal and an external row of similar sutures anteriorly. The stomach is loosely tacked to the diaphragm, or if the jejunum has been used, it is fixed both to the diaphragm and to the margins of the mesocolic defect through which it has been passed. The diaphragmatic defect is closed, the lung re-expanded, and the chest wall closed after insertion of a de Pezzar catheter through a stab wound in the interspace below the incision. The appearance of the operative field after the various anastomoses employed in this series of patients is shown in Figures

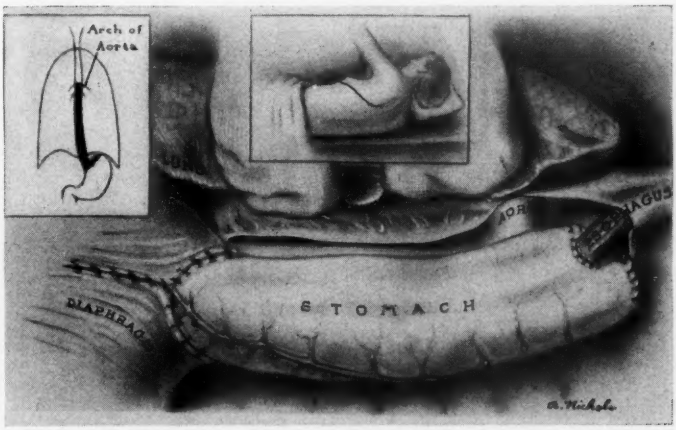

Fig. 4. Appearance of the operative field after resection of carcinomas at the level of the aortic arch.

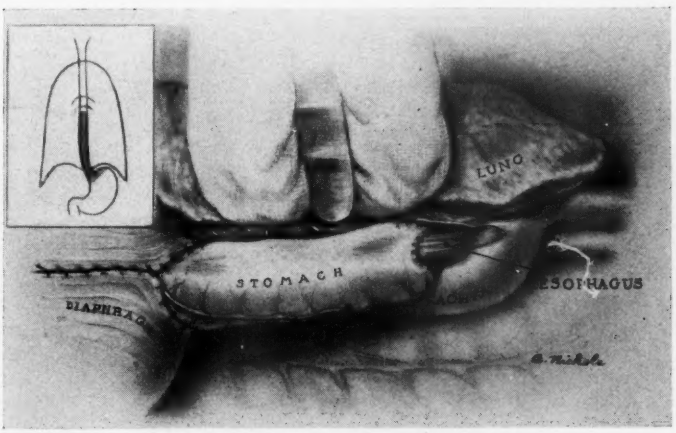

Fig. 5. Appearance of the operative field after resection of carcinomas of the lower third of the esophagus.

4, 5, 6 and 7. Occasionally non-resectable tumors may be by-passed through either an esophagogastrostomy or an esophagojejunostomy (figs. 8 and 9). During operation shed blood is replaced with whole blood, volume for volume. Postoperatively we routinely employ chest suction, nasal oxygen, parenteral fluids, and prophylactic penicillin therapy. Nothing is permitted by mouth until the fourth postoperative day when the ounce of water per hour is administered. Over the next four days the patient is rapidly advanced to six soft

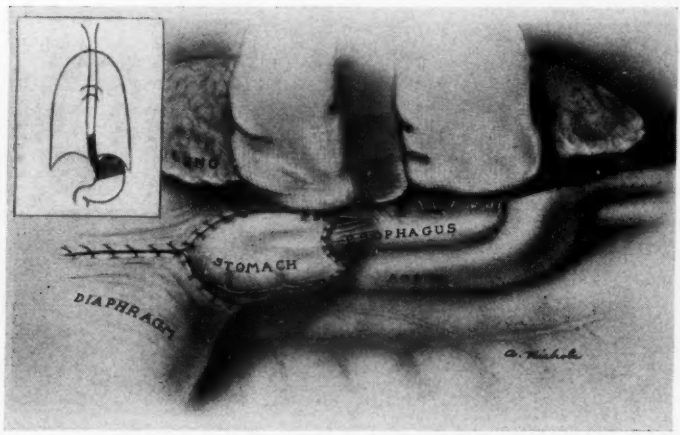

Fig. 6. Appearance of the operative field after resection of carcinomas arising in or near the cardia.

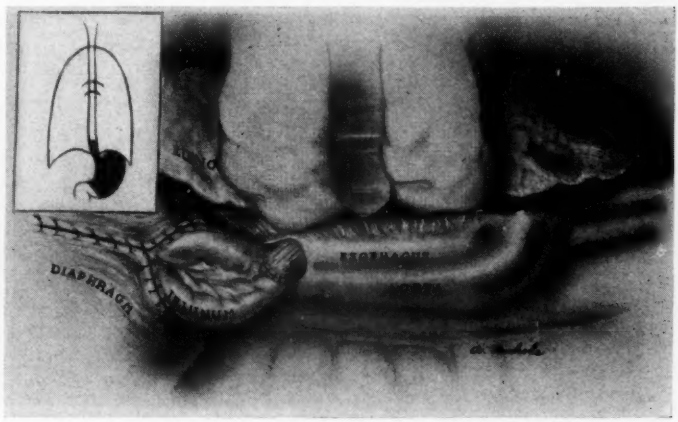

Fig. 7. Appearance of the operative field after total gastrectomy.

feedings a day on which dietary routine he is discharged from the hospital on the twelfth postoperative day. Ambulation is begun 12 to 24 hours after operation, and the chest drain is removed on the fifth postoperative day.

Table IV indicates the immediate course of the fifty patients in this series. For one surgery was not advised. Two refused consent for operation. Jejunostomy under local anesthesia was established in one patient who entered the hospital in extremis, the result of

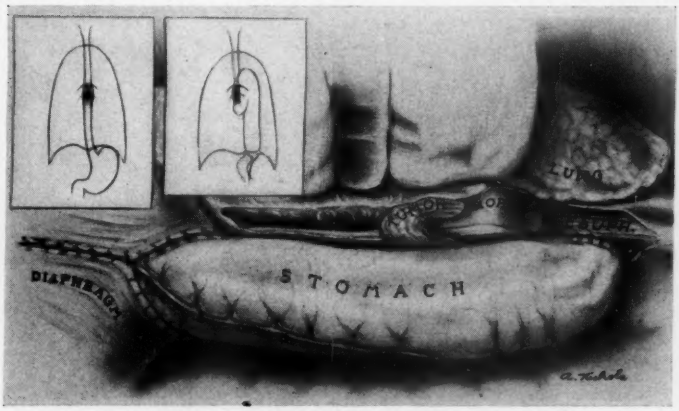

Fig. 8. Esophagogastric shunt for non-resectable tumors of the lower and mid-thoracic esophagus.

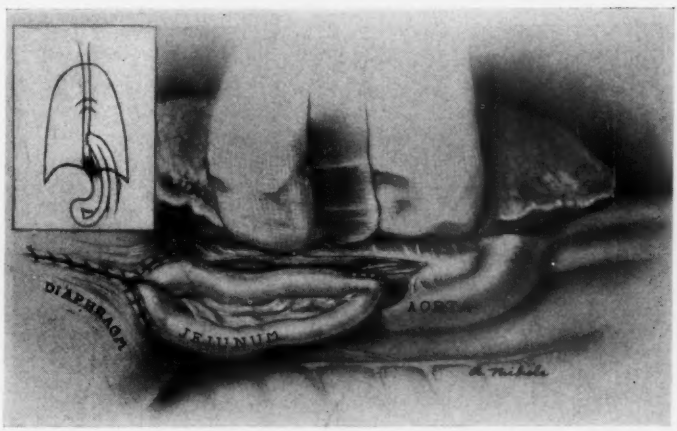

Fig. 9. Esophagojejunal shunt for non-resectable tumors of the lower esophagus and stomach.

starvation and dehydration. This patient never aroused from her initial disoriented state and expired on her second postoperative day. At operation 15 patients were found to have disease advanced to a degree where not even a palliative operation appeared to be justified. Each of these patients left the hospital without complication. One esophagogastrostomy and one esophagojejunostomy were used without complication in two patients presenting widespread metastases. Two men with high-lying tumors and without

TABLE IV

OPERATIONS EMPLOYED

	NO. OF CASES	DEATHS
SURGERY NOT ADVISED	1	
REFUSED SURGERY	2	
JEJUNOSTOMY	1	1
EXPLORATION ONLY	15	0
SHUNTING OPERATION	2	0
RESECTION WITH GROSS RESIDUAL TUMOR	2	2
SIMPLE RESECTIONS:		
A. LOW ANASTOMOSIS	7	1
B. ANASTOMOSIS AT AORTIC ARCH	5	1
C. ANASTOMOSIS ABOVE AORTIC ARCH	6	2
RESECTION INCLUDING TOTAL GASTRECTOMY	4	0
COMBINED RESECTION	6	1
	50	8

A ANTE-AORTIC ANASTOMOSIS

Σ INCLUDING TOTAL GASTRECTOMY

remote metastases were resected through grossly recognizable tumor tissue. Both operations were prolonged traumatic ordeals and neither patient recovered from the effects of the procedure, one dying 18 hours and the other 36 hours after operation. Eighteen ordinary resections were carried out, 7 low in the chest, 5 at the aortic arch, and 6 above the arch. One, one, and two patients were lost from each of these groups respectively. Death in these 4 patients was due to cardiac failure (4th day), pulmonary embolism (14 hours), pneumonia (21st day), and empyema (14th day). The remaining 14 patients did not have significant complication. In 4 patients the entire stomach was included in the resection without fatality. Combined resections were carried out on 6 patients. In 5 the tail and part of the body of the pancreas were involved, in 2 the left adrenal, and in one the major part of the left lobe of the liver. One of these patients had a primary carcinoma in the mid-thoracic esophagus and another on the lesser curvature of the stomach. In 3 the entire stomach was resected. The only seriously complicated patient in this last group died after four days of uncontrollable hypotension.

Many of the 15 patients surviving simple exploration obtained brief, partial remission of dysphagia as the result of mediastinal dissection and tumor mobilization. Excellent palliation following the two shunting operations. Twelve of the 23 resection survivors are now dead, though with three exceptions these patients were able to resume a normal or nearly normal life before finally succumbing. Eleven resected patients are alive and well for periods of from a few months to two years after operation, though one of them was found to have a supraclavicular metastasis on routine check-up two months ago, two years after operation.

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INJURIES OF THE GENITO-URINARY TRACT

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INJURIES of the genito-urinary tract may be divided into two groups: 1. Those due to surgical accidents; 2. Those due to direct trauma.

Injuries caused by direct trauma are increasing in number and can be expected to increase further along with our rising automobile accident rate. The incidence of surgical accidents should decrease with broadening of our general surgical knowledge and better opportunities for surgical training offered today.

Early recognition of injury to the genito-urinary tract, due to either trauma or surgical accident, is sometimes quite difficult. However, if the surgeon's index of suspicion is always kept high when examining every victim of an accident, and when performing surgery on organs adjacent to the urologic tract, particularly pelvic and lower bowel operations, he will be rewarded with prompt recognition of injury in most cases. In case of trauma, usually evidence of other major injuries is quite obvious. Time and equipment may not be available for an elaborate diagnostic urologic study; furthermore, the patient's condition as a rule will not allow it. Careful examination for external evidence of injury to the kidney, bladder and urethra should be done as a routine procedure. The urine should always be examined, or at least grossly inspected, for hematuria. If the patient cannot void, one should not hesitate to insert a urethral catheter.

Injuries to the kidney, from a clinical standpoint, may be divided into two groups: 1. The contusions and moderate tears of the parenchyma which constitutes the vast majority of renal injuries; 2. The occasional patient with a tear of the renal pedicle or severe tear of the hilus, who will bleed to death if his injury is not recognized and promptly operated upon. The first group should be put to bed and observed closely. Daily physical examinations for increasing tenderness or mass in the flank, due to hemorrhage or urinary extravasation, are necessary to follow properly an injured kidney and determine the necessity of surgery.

The location of the injury and the presence of hematuria are the most important diagnostic signs. Partial fixation and rigidity of the abdominal wall is usually present. Tenderness at the costovertebral angle is also present. In uncomplicated renal lesions the patient's

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general condition is usually good unless the kidney has been severely fractured and profuse hemorrhage has occurred. Urinary infection occurs frequently and early.

A plain K.U.B. may give valuable information. Haziness of the renal outline, obliteration of the psoas shadow, deviation of the spine away from the injury suggest perirenal bleeding. Excretory urograms are valuable. This may be done in the presence of extensive injury without detriment to the patient. They are usually of no value, however, unless the patient is out of shock, because of the failure of the kidneys to secrete. No function, poor filling or extravasation of the dye may be seen on the affected side. Cystoscopy, with retrograde pyelograms, give the most exacting information but is usually unnecessary during the early stages.

Conservative treatment is indicated in most cases. The vast majority of patients were treated conservatively during World War II with good results. Lynch,[1] in a recent excellent comprehensive study of 23 cases at Memorial Hospital, Charlotte, N. C., advised exploration in all cases in which there is x-ray evidence of extravasation of intravenous or retrograde dye or obliteration of the renal or psoas shadow. Seventy-two hours was arbitrarily set as the ideal time to explore the kidney provided severe hemorrhage and shock do not require immediate operation. All cases of renal injury, treated conservatively, should have follow-up kidney studies six months after injury because of frequent late pathologic changes.

Ureter

Traumatic wounds of the ureter are comparatively rare; they are usually found with associated abdominal injury. If peritoneal fluid is found during abdominal exploration, urinary leakage should be suspected and the ureter inspected, as well as the bladder. If the ureter has not been completely severed, simple drainage and placing a ureteral catheter to the kidney pelvis for splinting and drainage is usually all that is necessary. If it has been completely severed, anastomosis over a T-tube may be possible. If near the bladder or renal pelvis, a reimplantation may be done. If this is not feasible, the simplest thing to do is a cutaneous ureterostomy; then time is left for a study of the opposite kidney before nephrectomy is resorted to.

By far the most common cause of injury to the ureter is a surgical accident. Adams[2] in 1943 reviewed the literature and found 782 reported instances of injury to the ureter during gynecologic surgery and added 3 cases. I am quite sure there are numerous others that have been recognized and not reported, besides the

number of single ureters that have been tied off without the surgeon or patient ever being aware of it. In fact, I dare say that there is not a surgeon present who has not heard of an instance of surgical injury to the ureter in his home community; so it certainly cannot be considered a rare phenomenon. It can happen and has happened to the best of surgeons.

Fortunately, it is a surgical catastrophe, if recognized promptly, that can be dealt with satisfactorily, usually without any permanent injury to the patient. The best insurance against this catastrophe is to have catheters passed up each ureter and left in just prior to surgery on the pelvic organs or lower bowel. This should certainly be done when any difficulty is anticipated in carrying out an elective operation. Treatment of the injury depends on the time of recognition and the condition of the patient. If discovered during the operative procedure an end to end anastomosis over a T-tube or ureteral catheter with extraperitoneal drainage should be done if possible. If that is not feasible, reimplantation into the bladder can be done either directly or by developing a tunnel flap from the bladder wall if the ureter is not long enough for direct implantation. This method has been described by Dr. Nelson M. Ockerblad[3] and we have used it recently with satisfactory results. This case will be presented later. It should be done extraperitoneally and consists of distending the bladder and turning back a rectangular flap from the anterior surface of the bladder wall sufficiently long to make a tunnel and reimplanting the ureter into this tunnel. If nothing else is feasible, a simple cutaneous ureterostomy should be done. Intentional ligation of the ureter has been done, but is mentioned only to be condemned.

In most cases injury of the ureter is not recognized until 24 hours, or longer, after surgery has been performed, complete absence of urinary output making it quite obvious that something is wrong. Dr. Tom Moore[4] of Memphis has reported satisfactory results with combined cystoscopy and reopening the abdomen, the cystoscopist putting the catheters in each lower ureter and manipulating them while the abdomen is open to aid the surgeon in finding the constriction, then passing the catheters on to the kidney after the obstruction is relieved. In most instances, however, nephrostomy must be done.

Injuries to the bladder and urethra usually occur from direct trauma, most frequently combined with injuries to the bony pelvis. Occasionally the bladder and urethra are injured during surgery on adjacent organs. Injuries of the urethra are usually accompanied by bleeding from the urethral meatus. Injuries to either require

prompt diversion of the urine, usually by suprapubic cystotomy and drainage of the extravasated areas. If possible the urethra should be repaired at the time of injury. Usually if a catheter can be passed and left in place, this is all that is necessary. After the catheter is removed the urethra should be dilated at frequent intervals.

Case Reports

Case 1. Mrs. C. G., 35 year old white female, was admitted to the hospital on Nov. 4, 1947, with diagnosis of endometriosis and ventral hernia. There had been two previous operations: 1st—uterine suspension and appendectomy; 2nd—repair of ventral hernia. On November 7, the abdomen was reopened. A total hysterectomy, bilateral salpingo-oophorectomy and repair of the ventral hernia were carried out under spinal anesthesia. Postoperative urinary output was as follows:

1st day—240 c.c. per catheter.

2nd day—60 c.c. per catheter.

3rd day—120 c.c. with enema.

4th day—360 c.c. voided.

5th day—210 c.c. voided.

6th day—240 c.c. voided.

7th day—180 c.c. voided.

8th day—Amount not recorded but patient voided 4 times.

9th day—120 c.c. recorded and patient voided 3 times without amount recorded.

10th day—210 c.c. recorded. On this day (November 17) she was discharged home. There was considerable nausea and vomiting postoperative, according to the nurses' records.

She was readmitted to the hospital on Nov. 22, 1947, at 9 a.m., because of nausea, vomiting and anuria. The examiner noted she was quite dehydrated and mentally cloudy. Blood pressure was 150/90. White blood cells 21,000; polys 95 per cent; hemoglobin 70 per cent; red blood cells 3,500,000; NPN 100 mg. She was given 1,000 c.c. dexiplex and 1,000 c.c. 5 per cent glucose in water. She continued to have nausea and vomiting and there was no urinary output. On the following morning (November 23) a colpotomy was done, under pentothal anesthesia, for an infected hematoma. Following this surgery she was given 1,000 c.c. of 10 per cent glucose in water.

At 3 p.m., November 23, we were asked to see the patient. At this time she had pulmonary edema and uremic breath. There had been no urinary output during her 30 hours in the hospital and none in several days, according to the history obtainable, which was not considered very reliable. Cystoscopy was done and the catheter met obstruction 4 cm. up each ureter which could not be passed. There was no urine in the bladder.

An immediate right nephrostomy was done under spinal anesthesia. The kidney was markedly enlarged, pelvis and ureter were distended. There was an immediate escape of 75 to 100 c.c. of urine under pressure when the pelvis was incised. During the first 8 hours after operation 4,590 c.c. of urine came through the nephrostomy tube. The postoperative course was satisfactory and there was adequate urinary drainage through the right nephrostomy tube. No

urine was obtained from the bladder. Repeated attempts to catheterize the ureters met with failure. Intravenous urogram revealed no function of the left kidney but good function on the right. Fourteen days after the right nephrostomy was done the lower left ureter was explored through a Gibson incision. The ureter was found to be completely occluded at the crossing of the iliac vessels and bound down by scar tissue. It was freed up, the obstructed area incised and catheter passed to the kidney pelvis and then on down the ureter into the bladder. The catheter was left in for 10 days but at no time was there any urinary output of any significance from the left kidney. She was sent home with a nephrostomy tube in the right kidney and a non-functioning left kidney on Dec. 22, 1947. She continued to do well, reporting back at frequent intervals for change of her nephrostomy tube.

We had decided to let her continue with a permanent nephrostomy, but the patient was never satisfied with this and continued to insist that we do something to get rid of the tube.

In July, 1948, we readmitted her to the hospital to explore the lower right ureter and find out if we could do anything else. This was done on August 5, under spinal anesthesia. A big dilated ureter was found running into a mass of scar tissue just over the pelvic brim where it was completely occluded. The entire lower third of the ureter from this point on was just a string of scar tissue. The ureter was too large and too short to transplant to the bowel, it lacked 4 inches reaching the bladder. We then decided to do Dr. Ockerblad's[3] operation. The bladder was distended and a rectangular flap, about 1½ inches wide, was cut from the anterior bladder wall extending from the base of the bladder to just a little to the right of the tip of the dome. It was then turned back, leaving it attached to the bladder superiorly. It was closed as a tunnel and the ureter reimplanted in the upper end with a No. 11 ureteral catheter extending from the bladder through the tunnel and ureter to the kidney pelvis. The defect in the bladder was closed and a Foley catheter left in. Postoperative course was uneventful. On the fourteenth postoperative day the ureteral catheter was removed and the nephrostomy tube clamped. The patient voided satisfactorily and the nephrostomy tube was removed the next day. The nephrostomy wound was dry within 24 hours and closed promptly. She was discharged one month after operation in good condition.

She is well and happy today. Her urine is sterile and P.S.P. is 40 per cent, N.P.N. is normal. So far we have been unable to get a catheter to this kidney but intravenous urograms do not show very much obstruction.

CASE 2. Mrs. L. M. S., 36 year old white female, was admitted to hospital in severe shock on Dec. 5, 1946. There was a large gunshot wound on the left hip, perforating the abdomen. At abdominal exploration numerous small perforations of the small bowel were found and repaired. The left ureter was seen but did not appear to be injured. The sciatic nerve and external iliac artery were injured. The vessel was ligated and a left colostomy was done. Postoperative course was stormy.

On Jan. 3, 1947, approximately one month after injury, we were asked to see the patient because of urinary drainage from the left hip wound. At this time cystoscopic and x-ray studies revealed stones in the right kidney, obstruction of the lower left ureter with extravasation of dye injected through the left ureteral catheter out through the fistulous opening in the left hip. Intravenous urogram revealed good function of the left kidney but considerable hydronephrosis. In view of the stone in the right kidney it was felt imperative to save the left kidney. On January 8, the lower left ureter was explored.

It was found completely severed and bound down with dense adhesions. Both segments were freed up with considerable difficulty and an end to end anastamosis done over a ureteral catheter. Her postoperative course was prolonged, because of moderate persistent urinary drainage from the wound but uneventful, except for a few bouts of fever and two blockages of the right ureter with a stone which was relieved by cystoscopic manipulation. She was discharged on June 3, 1947, with the wound healed well. Intravenous urogram, in July, 1948, over one year after operation, revealed no stones and good function of each kidney with no hydronephrosis.

CASE 3. C. S., 26 year old soldier, was first seen by us on Oct. 11, 1944, when transferred to an Army General Hospital in this country. While going into action at St. Lo, France, July 18, 1944, he had been hit by mortar shell fragment in the left buttock at approximately 5:00 p.m. He lay down for about half an hour and then walked to an ambulance which took him to an aid station. There he received a dressing, morphine and was taken to the 44th Evacuation hospital. During this period he did not have abdominal pain. There was a constant desire to urinate, but he could not pass his urine. He also had an unsuccessful desire to defecate. At the 44th Evacuation Hospital catheterization revealed hemorrhagic urine and he was immediately operated upon, on July 19. At operation, it was found that the fragment had penetrated the rectum and urinary bladder. A colostomy and suprapubic cystotomy was done and the vesicorectal fistula repaired. After 12 days he was flown to 56th General Hospital in England. He remained there two and a half months, during which time there was still present a fecal fistula on the left buttock. He was then evacuated to this country.

Physical examination, on arrival here, revealed considerable emaciation (patient had lost 45 pounds), colostomy working, suprapubic tube in place and a fistulous opening in the left buttock.

Cystoscopic examination, Oct. 16, 1944, revealed a markedly contracted bladder with diffuse inflammatory process present and a small stone was found in the bladder. His bladder was treated with sulfa therapy and local irrigations. An intravenous urogram on the same date revealed a normal left kidney, marked hydronephrosis and hydroureter on the right with apparent obstruction of the right ureter in the lower third. On October 24, cystoscopy revealed marked improvement, but this time revealed a marked deformity of the bladder wall in the region of the right orifice. Ureteral opening could be seen, but could not be catheterized. Cystogram revealed two oval-shaped bodies, one lying behind the bladder on the right side. Indigocarmine injected into the bladder failed to appear in the rectum. A catheter was passed through the rectal fistula and seen in the rectum.

His general condition improved gradually and his fistula completely closed. It was felt that he had had injury of his lower right ureter with a formation of a traumatic diverticulum with progressive hydronephrosis.

On Jan. 25, 1945, patient was carried to surgery and through a right paramedian incision the lower right ureter was explored. The ureter was found to be considerably dilated, being approximately the size of a thumb. It was freed down to the point of obstruction which was just at the bladder wall. At this part it was firmly adherent to the pelvic wall and markedly constricted. The ureter was clamped here, cut and reimplanted into the bladder, small rubber tube being passed up to the ureter for drainage and splinting and brought out through the suprapubic wound.

His postoperative convalescence was uneventful except for a rather persistent wound infection. Retrograde pyelograms on March 2 revealed marked improvement in the hydronephrosis of the right kidney. The splinting catheter was removed on March 6. On March 12 the suprapubic tube was clamped off and normal voiding occurred. Following this a urethral catheter was inserted and suprapubic wound allowed to close. On the 5th of May, three months after surgery, an intravenous urogram revealed excellent function of both kidneys with no further evidence of obstruction and good emptying of the dye in the upright position.

SUMMARY

1. Traumatic and surgical injuries of the kidney, ureter, bladder and urethra have been discussed.

2. Nonoperative treatment is advocated for injuries of the kidney where there is no urinary extravasation. Early operative treatment is advocated for all cases with extravasation or severe hemorrhage.

3. Two cases of traumatic injury of the ureter and one surgical injury are presented.

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BENIGN LESIONS OF THE BREAST

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THE diagnosis of benign lesions of the breast is important in order to rule out carcinoma, to avoid unnecessary or unnecessarily extensive surgery for a benign lesion, to determine the proper therapy for the breast lesion, and in some cases to establish the diagnosis of tumor or hyperplasia of the ovary, testis, adrenal cortex or pituitary. A classification of some of the benign lesions of the breast is presented in Table 1. Those lesions in section A are peculiar to the breast and depend on hormonal disturbances. A consideration of the developmental and physiologic changes in breast tissue is pertinent to an understanding of these indigenous benign lesions.

At birth, in both male and female, the breasts consist of a small group of ducts immediately beneath the nipple. Estrogenic hormone circulating in the blood and demonstrable in the urine often leads to neontal mastitis or hypertrophy. There is swelling in the breast with hyperplasia of the ducts and edema of the connective tissue about them. This usually subsides rapidly. Normally the ducts then remain dormant until the time of puberty when estrogenic stimulation begins and is followed by stimulation from progestin, the hormone of the corpus lutem. It is thought that estrogen stimulates ductal hyperplasia whereas progestin stimulates acinor hyperplasia. It is also thought that progestin and estrogen may be physiologic antagonists. At any rate, following puberty, the female breast develop into an adult structure by the budding of its duct system and the formation of acinae from these buds. Figure 1 is a microscopic section of a more or less normal adult breast. In it are seen the glandular elements separated by fibrous tissue and fat. The ducts are surrounded by loose cellular connective tissue called the periductal tissue.

In so-called infantile hypertrophy, there is a precocious development of the breasts in young girls usually between the third and eighth years. This may be the cardinal symptom of certain tumors, cysts, and hyperplasias of ovary or adrenal, or of pituitary syndromes. In every instance excessive secretion of estrogen is present.

Diffuse virginal hypertrophy is a comparatively rare condition in

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which the breasts may grow to enormous size. It usually begins at puberty but may be initiated later by a pregnancy.

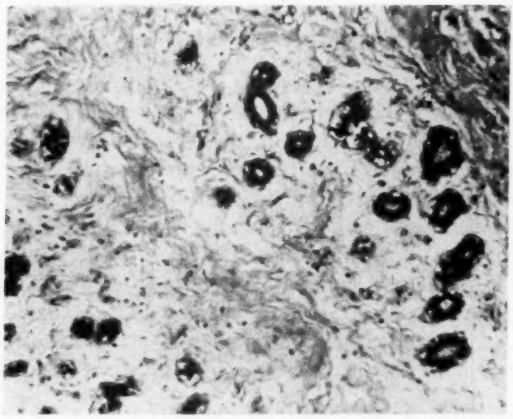

Fig. 1. Normal breast tissue

Gynecomastia is in all probability due to hormonal imbalance. It is most frequently seen at puberty when the male may develop a button of a breast tissue beneath one or both nipples. Womac[1] prefers to call this condition hormonal mastitis. It is probably due to an excess estrogen secretion by the testicle or hyposecretion of androgenic hormone. Most of these pubertal gynecomastias will disappear, particularly if male sex hormone is used in therapy. A large number of cases of gynecomastia were reported in soldiers who were prisoners of war of the Japanese in the recent conflict.[2-4] It has been theorized that vitamin deficiency impaired the function of the liver to the extent that estrogen was not destroyed by the liver at the normal rate. This might suggest that vitamins, particularly the B complex, may be of value in the treatment of pubertal gynecomastia and in some cases of chronic cystic mastitis. Gynecomastia is frequently seen today in the male with carcinoma of the prostate in which metastatic lesions are managed by Stilbestrol therapy. One of us (W.A.G.) has reported such a case in which Stilbestrol led to the development of mammary carcinoma.[5] Gynecomastia may be due to tumors of the testis, adrenal cortex or pituitary gland.

It should be remembered that in the female at puberty the development of one breast may start before that of the other. In such cases, a small button of tissue quite firm and rubbery in consistency may be found beneath one nipple. This should not be confused with a tumor inasmuch as the removal of this would be the removal of the entire nidus from which the breast develops.

It is probable[6] that there is a cyclic change in the breasts during the menstrual cycle. After rupture of the ovum and formation of the corpus luteum there is hyperplasia of duct epithelium, acinar budding, edema and swelling in the periductal connective tissue, and round cell infiltration. These account for the swelling and pain which many women experience just prior to the menstrual period. With menstruation, involution takes place. With pregnancy, the prolonged effect of the corpus luteum leads to the full development of the breasts as a physiologic unit. It is thought that this phase of proliferation usually reaches its goal after 4½ or 5 months of pregnancy.[1] However, lactation does not take place until after delivery or abortion, when the placental inhibitory influence is removed and the pituitary hormone prolactin exerts its effect. With the cessation of lactation, involution takes place. The breast, however, never returns to its previous state inasmuch as the glandular overgrowth does not entirely disappear, some epithelial and fibrous hyperplasia remaining. At the menopause further involution takes place with the disappearance of much of the glandular tissue of the breasts. It is during this period, as well as the period of developing sexual life, that disturbance or imbalance in hormonal regulation is most apt to lead to the common benign lesions indigenous to the breast.

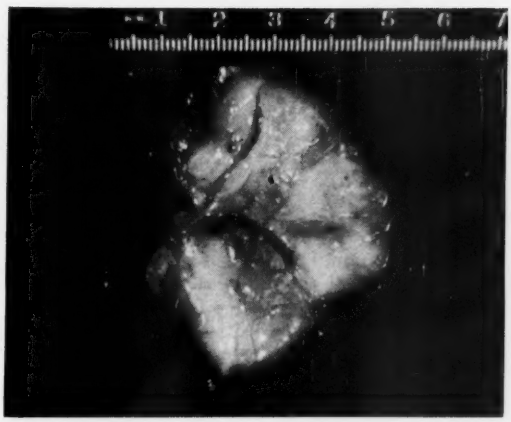

Fig. 2. Pericanalicular fibroademona.

Fibroadenomas tend to develop earlier than other indigenous benign lesions of the female breast. They are probably due to hormonal imbalance. Localized overgrowth of glandular tissue and fibrous connective tissue takes place in a localized area. About this

local growth, the normal breast tissue is compressed so that an apparent capsule is formed. Actually, this is in most instances a false capsule, and there are those who feel that fibroadenoma of the breast is not a true neoplastic process but rather an extremely localized counterpart of chronic cystic mastitis. Certain it is that the

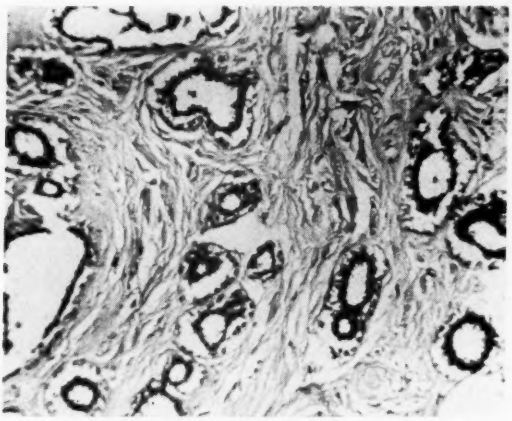

Fig. 3. Pericanalicular fibroadenoma.

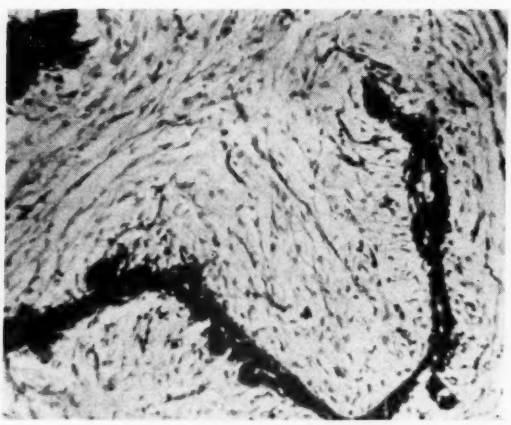

Fig. 4. Intracanalicular fibroadenoma.

lesions are frequently indistinguishable microscopically. Figure 2 is a gross specimen of a pericanalicular fibroadenoma. Figure 3 is a microscopic section of this tumor. This and other sections of this supposed tumor were labeled chronic cystic mastitis by two path-

ologists. Figure 4 is a microscopic section of an intracanalicular fibroadenoma. This characteristic picture is produced by the invagination of the ductal walls by the proliferating fibrous tissue.

Fig. 5. Chronic cystic mastitis, showing minimum proliferation.

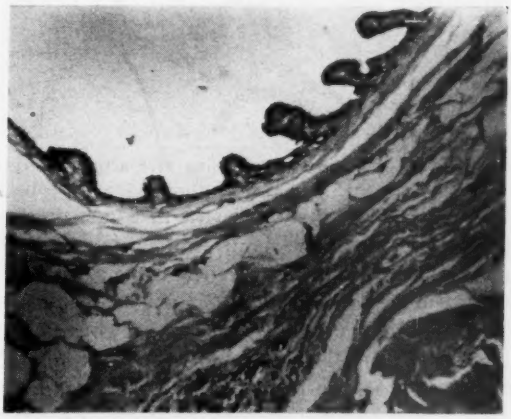

Fig. 6. Chronic cystic mastitis, showing beginning papillary projections.

Chronic cystic mastitis is the commonest of all lesions of the breast. The name is not well chosen inasmuch as the lesions may not be cystic and it is questionable whether inflammation plays any part. However, this terminology has gained such common usage that it seems unwise to attempt a change. The diagnosis chronic cystic mastitis is employed in a variety of lesions of the breast all

dependent upon aberrant physiology. In general the lesions may be said to originate from abnormal or imbalanced hormonal stimulation and/or delayed involution. The abnormal stimulation may result in an hyperplasia involving largely the connective tissue of the breast with little or no hyperplasia of the epithelial elements. In even more cases the hyperplasia found is predominantly of the epithelial elements. In some of these the epithelial proliferation is of such an extent and character that the lesion is thought to be a precancerous one. In those cases developing at or following menopause, cyst formation may be the predominant feature and irregular or delayed involution is thought to be etiologic.

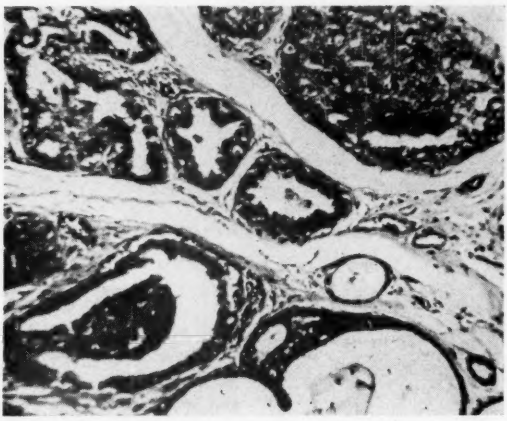

Fig. 7. Chronic cystic mastitis, showing very active hyperplasia.

Figure 5 shows chronic cystic mastitis in which there is dilatation of the ducts without hyperplasia or piling up of the lining membrane. Figure 6 shows chronic cystic mastitis in which papillary projections have developed from the lining membrane of the cyst or dilated duct. Figure 7 shows a section of chronic cystic mastitis in which there is not only piling up of the cells lining the ducts but papillary projections and in one area of the slide a proliferation of epithelial cells which completely fills the duct. This type of lesion, particularly when the cytologic study shows increased mitosis, irregular and large hyperchromatic nuclei and other evidence of very active hyperplasia, is regarded by Cole and Rossiter[7] and others as a precancerous lesion. Figure 8 represents a microscopic section of a so-called papilloma. In this situation we find a localized overgrowth of epithelium perhaps in one location only. When the stalk shows no invasion it is regarded as a benign lesion; however, it also is considered by many as a precancerous lesion.

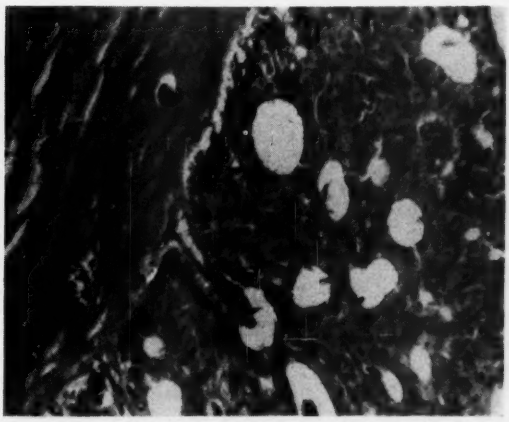

Fig. 8. Papilloma of a duct.

Section B of Table 1 lists benign lesions of the breast which may not be considered as manifestations of aberrant physiology. Their chief importance lies in differentiating them from malignant lesions of the breast. This is particularly true of plasma cell mastitis, fat necrosis and some of the acute and chronic pyogenic infections.

Figure 9 is a photograph of a patient presenting a left breast appearing smaller than the right with an inverted nipple and an

TABLE 1

Benign Lesions of the Breast

A.	
Neonatal Mastitis or Hypertrophy	
Infantile Hypertrophy	
Diffuse Virginal Hypertrophy	
Gynecomastia	
Fibroadenoma	
Chronic Cystic Mastitis	
Papilloma	
B.	
Benign Nonindigenous Tumors—	(Lipoma
	(Angioma
	(Fibroma
	(Teratoma, etc.
Pyogenic Infections—	(Acute
	(Chronic
Plasma Cell Mastitis	
Fat Necrosis	
Tuberculosis	
Syphilis	
Actinomycosis	

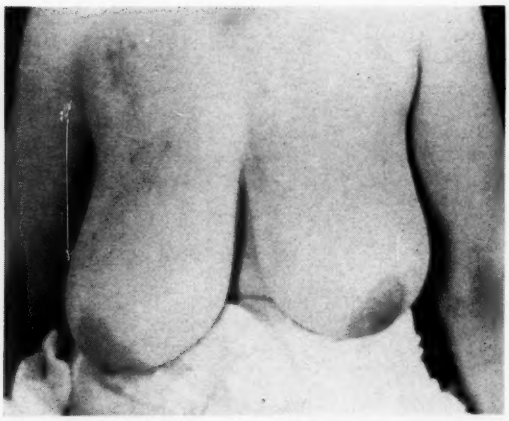

Fig. 9. Chronic pyogenic mastitis with retraction of nipple.

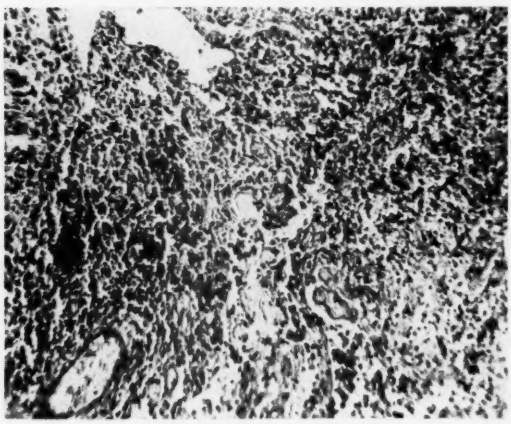

Fig. 10. Chronic pyogenic mastitis.

indurated area 3 centimeters in diameter behind and below the nipple. The skin overlying the lump was definitely pigskin in appearance. The patient was referred with a diagnosis of carcinoma of the breast. She gave a history of first having had trouble three years before when there was some swelling in the breast at about the same location as the present lump. The breast was quite sore and the skin over it was reddened. However, this lump subsided with the drainage of pus through the nipple. She reported this pus was creamy, cloudy fluid. She did not know for sure whether the lump went completely away. The present lump was noted about

three months prior to her referral to the clinic. Soreness was present from the onset. She stated that at one time the lump was larger than now but that there was again a discharge of pus from the nipple and it decreased in size. There has been no discharge of pus from the nipple in the last few weeks but the breast has remained sore particularly just below the nipple. When the radial incision from the nipple was made over and through this mass a small abscess cavity was found within a hard fibrous shell. A frozen section demonstrated only inflammatory tissue. Figure 10 is the microscopic picture of this lesion. The local lesion was resected and the wound partially closed about a Penrose drain.

Figure 11 is a photomicrograph of a section from a plasma cell mastitis. This patient gave a history of having noticed a small growth beneath the nipple in the right breast six months prior to surgery. It increased slightly in size over this period of time and some deformity of the nipple had developed a few weeks before she was first seen. The character of this nodule with retraction of the nipple suggested malignancy. Adair[8] has called attention to the lesion as one which may be confused with malignancy.

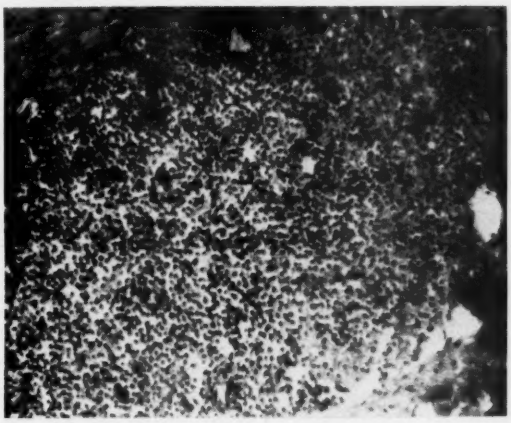

Fig. 11. Plasma cell mastitis.

Figure 12 is a photomicrograph of fat necrosis in a breast. This condition was first reported by Lee and Adair[9] in 1924. This 65 year old woman had a firm mass just posterior and inferior to the nipple about 2 centimeters in size. There was some retraction of the nipple. At exploratory surgery it had the gross appearance of an homogenous infiltrating growth. The exploratory incision was closed and a radical mastectomy was performed. Paraffin sections

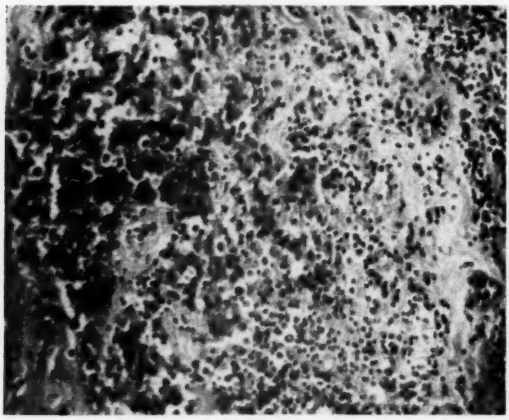

Fig. 12. Fat necrosis of breast.

of the lesion presented this typical picture of fat necrosis. A frozen section at the time of surgery would have obviated the radical procedure.

For the purpose of this study, the last one hundred cases of benign lesions of the breast which have come to surgery at the clinic have been analyzed. During the period that these cases were admitted a like number of cases of carcinoma of the breast have been seen. Table 2 shows the classification of these cases as

TABLE 2

Diagnosis in 100 Patients with Benign Lesions of the Breast

Diagnosis		*Female*	*Male*
Chronic Cystic Mastitis	57	57	
Gynecomastia	9		9
Fibroadenoma	18	15	3
Papilloma	6	6	
Fat Necrosis	1	1	
Plasma Cell Mastitis	1	1	
Chronic Pyogenic Mastitis	1	1	
Lipoma	7	6	1
	100	87	13

to diagnosis. Table 3 shows the approximate age of these 100 patients. It will be noted that the largest number of patients with chronic cystic mastitis fell in the range between 36 and 45 years of age. Those with fibroadenoma tended to be younger. The age spread in the cases of gynecomastia is interesting. Table 4 shows the marital status of the female patients with chronic cystic mastitis,

TABLE 3

Age of 100 Patients with Benign Lesions of the Breast

Age in Years	11 to 15	16 to 25	26 to 35	36 to 45	46 to 55	56 to 65	65 to 75
Chronic Cystic Mastitis							
Precancerous			2	8	3		
Others		2	10	19	11	1	1
Gynecomastia	2	1		2	2	2	
Fibroadenoma		3	7	3	5		
Papilloma			1	1	3	1	
Fat Necrosis						1	
Plasma Cell Mastitis			1				
Chronic Pyogenic Mastitis					1		
Lipoma				2	4	1	

TABLE 4

Marital Status of the 78 Female Patients with Benign Indigenous Lesions of the Breast

	Single	*Married*
Chronic Cystic Mastitis		
Precancerous	0	13
Others	4	40
Fibroadenoma	4	11
Papilloma	3	3

TABLE 5

Pregnancy Record of the 78 Female Patients with Benign Indigenous Lesions of the Breast

	Nulliparous	*Parous*	*No Record*
Chronic Cystic Mastitis			
Precancerous	3	9	1
Others	12	26	6
Fibroadenoma	6	7	2
Papilloma	4	2	0

TABLE 6

Chronic Cystic Mastitis

	Cases	*Per Cent*
Adenofibrosis	8	14
Parenchymatous Hyperplasia	17	30
Precancerous Hyperplasia	13	23
Cystic Disease	19	33
Total	57	

fibroadenoma and papilloma. Table 5 gives the pregnancy record in this same group of patients. Table 6, groups the cases of chronic cystic mastitis according to the classification proposed by Cole and Rossiter.[7] All the slides of the cases in this group were reviewed. The finding of 23 per cent with precancerous hyperplasia corresponds rather closely with the figures of others. Cystic disease in 33 per cent is high as compared to other figures. More of these cases might have been placed in the group of parenchymatous hyperplasia.

This classification has much merit, in defining those lesions which may be precancerous. If every surgeon studied the microscopic pathology in his own surgical patients, those having such lesions would receive better care. If simple mastectomy has not been done, these patients must certainly be examined at frequent intervals, as it has been variously estimated that 5 to 30 per cent of them will ultimately develop malignancy.[1,7] Figures are not available to prove these estimates and will not be available until large series of cases have been followed over the life span remaining after partial mastectomy.

TABLE 7

Surgery Performed

	Radical Mastectomy	*Simple Mastectomy*	*Partial Mastectomy*
Chronic Cystic Mastitis			
Precancerous	1*	2	10
Others		7**	37
Gynecomastia		8	1
Fibroadenoma		1***	17
Papilloma		4	2
Fat Necrosis	1		
Plasma Cell Mastitis			1
Chronic Pyogenic Mastitis			1
Lipoma			7
Total	2	22	76

*Had preoperative self-administered x-ray therapy.
**One patient had partial mastectomy previously. One patient had partial mastectomy each breast prior to bilateral simple mastectomy.
***Male.

Table 7 presents the type of surgery employed in the management of these one hundred cases. The radical mastectomy for the one case of fat necrosis cannot be justified. Radical mastectomy for the one case of precancerous chronic cystic mastitis can be justified in that this patient, without medical advice, administered x-ray therapy to her own breast. She was a receptionist in a doctor's office and

did not seek medical advice until she had developed a burn from the x-ray therapy. A radical mastectomy seemed to be the wise procedure under the circumstances. It should be noted that of the nine simple mastectomies done for chronic cystic mastitis, only two were in the precancerous group. In the remaining seven, one patient had had partial mastectomy previously and one patient had had partial mastectomy on each breast prior to the bilateral simple mastectomy.

If errors in diagnosis and treatment are to be avoided in surgical lesions of the breast, a thorough and well planned study must be made on each case. A complete history and general physical examination are essential. There must be a very careful examination of the breasts and axillae. The breasts should be examined by inspection and palpation first with the patient sitting with her hands in her lap, then with her hands behind her head. Then breasts and axillae should be examined with the patient in a recumbent position. This all should be done in a good light. Any minor dimpling of the skin overlying a tumor should be demonstrated. Retraction of the nipple, pigskin appearance, etc., are rarely overlooked. The character of the growth to palpation, its mobility or lack of mobility within the breast itself and with respect to deeper structures and the skin, the presence or absence of fluctuation, tenderness, redness of the skin and discharge from the nipple should be carefully noted. Transillumination has not been of great value in our hands but should be a part of the examination of every breast. It is useful in the localization of papillomata. The mere fact that a lesion will transilluminate well does not mean that it is a benign lesion. A small carcinoma may lie beneath an obviously cystic tumor.

Study of smears of discharge or scrapings from the nipple may be found useful in those cases with discharge from the nipple or ulcerative lesions at the nipple. We have found cancer cells in the discharge in one case of early Paget's disease of the nipple. In one other case in which Paget cells were demonstrated in biopsy of the nipple the Papanicolaou stains of smears from the lesion were negative. In this latter case metastatic carcinoma was found in the axillary lymph nodes but no carcinoma could be found in the breast.

The last step in the diagnosis of benign lesions of the breast is diagnostic surgery. The indications for diagnostic surgery may be outlined as follows:

1. An isolated gross lump or nodule, solid or cystic, in the breast.
2. Increasing nodularity or evidence of growth in a diffuse lesion of the breast particularly when these occur in a localized area.
3. Bloody or serous discharge from the nipple.

4. Persisting eczema or ulceration at the nipple.

The term "diagnostic surgery" is used in preference to biopsy. This surgery should be performed in a hospital, where radical mastectomy may be performed at the time if a diagnosis of malignancy is established. The experienced surgeon is able to make the correct diagnosis on the gross appearance of the lesion in 80 to 90 per cent of cases. However, he will avoid mistakes if he does not perform radical mastectomy without microscopic proof of malignancy. Frozen sections at the time of exploratory surgery will make the diagnosis in nearly every case. In those few cases in which doubt exists, radical surgery should be deferred until carefully prepared paraffin sections are studied and found diagnostic of malignancy.

SUMMARY

Benign lesions of the breast may be divided into a group peculiar to the breast and largely dependent upon aberrant physiology, and another group including nonindigenous tumors, pyogenic infections, infectious granulomata, plasma cell mastitis and fat necrosis. Many of these may be confused with carcinoma. A consecutive series of one hundred benign lesions is analyzed. A plan for careful study of all lesions of the breast is outlined. The indications for diagnostic surgery are enumerated. The importance of accurate diagnosis is stressed as essential to ruling out carcinoma, the avoidance of unnecessary or unnecessarily extensive surgery, to determine the proper therapy for the breast lesion, and in some cases to establish the diagnosis of tumor or hyperplasia of the ovary, testis, adrenal cortex or pituitary.

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SUPRACONDYLAR FRACTURES OF THE HUMERUS

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WITH diligence, perseverance and determination, without the aid of anesthesia and the x-ray, our predecessors went far in the recognition and treatment of supracondylar fractures. They should not be forgotten.

While it was not possible to include and quote all of the contributors on the subject of supracondylar fractures, I have tried to select some in chronological order. This should give us an insight into the different eras and depict the various trends of treatment.

Charles Bell in 1809 wrote very briefly about fractures of the humerus and considered them the simplest of all fractures. He failed, however, to mention fractures of the lower end of the humerus.

Petit and Duverney, who were among the moderns, made no mention of supracondylar fractures.

Heister referred to this fracture only to express an unfavorable prognosis and gave no recommendations for treatment.

Pierre Joseph Desault published in 1817 "A Treatise on Fractures, Luxations and other Affections of the Bones." I quote from this book: "Fractures of the humerus, accompanied with a separation of the condyls appear to have escaped the notice of most authors who have written on diseases of the bones. The ancients have transmitted nothing to us on this point. Yet it is by no means rare to meet with examples of it in practice. Desault, in particular, has had frequent occasions to observe it."

Desault recognized the importance of differentiating between real supracondylar fractures, dicondylar fractures and fractures of either the internal or external condyle. He stressed the eliciting of crepitus, by moving the fragments, as a diagnostic point. He considered these fractures as very serious ones and mentioned as complications, "A swelling of the adjacent parts, their inflammation, a continuance of the pains after reduction, extensive abscesses, a gangrene even of the soft parts and a caries of the bones."

Others of his day considered and "hoped for" an ankylosis as a most favorable termination.

It was generally conceded that the contact of air with the injured joint was a possible cause of complications.

Deductions, however, convinced Desault that the want of a skill-

ful mode of treatment and the use of an improperly constructed apparatus were the real causes.

He appreciated the antagonistic action of the supinator and pronator muscles. He utilized four splints. The anterior and posterior were flexible, as they served in reduction. The medial and lateral were rigid to prevent spreading and rotation of the condyles.

He elevated the limb to prevent swelling. Swelling was also combated by blood-letting, a low diet, diluting drinks and antiphlogistic remedies. Bandages were wet with vegetomineral water and loosened as required by the swelling and reapplied tighter as swelling subsided. He also recognized the value of early mobilization. His practice was to discard the splints on the twenty-second day. Gentle flexion and extension were started on the twenty-fourth day. Pain and the patient's perseverance were described. After the thirtieth day range of motion increased rapidly.

I quote him again: "On the thirty-seventh day, the patient was discharged cured and free from every vestige of his disease, except a trifling stiffness, which was doubtless soon removed by the motions of the joint."

From Desault's writings it is clear that he was most meticulous.

Astley Cooper in his publication of 1825 differentiated between supracondylar fractures and elbow dislocations by extending the elbow. This position gave apparent correction of the deformity if there was dislocation. He found that rotation of the forearm on the humerus produced crepitus above the elbow which signified fracture. The treatment described by him did not differ from that of Desault.

Fahnstock in 1830 described supracondylar fractures and stressed the necessity of perseverance in the efforts to obtain adequate reduction. He paid strict attention to the tightness of the dressings and splints. He also believed in early motion and its value in preventing ankylosis.

The work of Hugh Owen Thomas (1843-1891) started the trend of fracture treatment toward our present day methods. He insisted upon "enforced rest, uninterrupted and prolonged." Thomas did not take seriously either atrophy of disuse or joint stiffness, feeling that they could be overcome after firm bony union.

After the advent of the x-ray and with its use Robert Jones (1855-1933) practiced and introduced many different methods of fracture treatment. He considered the principles underlying the treatment to be the important factor rather than the technic itself.

He paid much more attention to the restoration of function than he did to x-ray appearance.

Thomas Pickering Pick, in his publication, "Fractures and Dislocations," 1885, expressed no difficulty in replacing the fragments by means of simple extension. He described an anterior angular splint which was first firmly applied to the arm. When the forearm was flexed and bandaged to it, this angular splint acted as a fulcrum and forced down the lower fragment. A pad was placed between the splint and the forearm.

Pick favored longer immobilization than Desault, four weeks instead of twenty-two days, and did not consider the joint stiffness to be permanent. He stressed that early movement of the elbow was one of the causes to which failure of union could be attributed, as this also allowed motion at the fracture site.

In 1888 C. A. Powers considered these fractures unpredictable as to prognosis and referred to the concern which they caused the attending surgeon.

He stated: "Accurate diagnosis is indispensable to intelligent treatment."

In his writings Powers also stated: "He who handles a traumatic elbow as lightly as he would if it contained eggs which he feared he would break, will not arrive at an accurate diagnosis."

He described the various maneuvers used and mentioned how steady pressure will move edema so that palpation could be of value. He used ether anesthesia for examination of the limb.

He did not consider it advisable to wait for the swelling to subside.

Powers' treatment had two chief aims: (1) Complete restoration of the joint function. (2) Avoidance of deformity.

He was opposed to early motion and quoted Allis as follows: "It cannot hasten but may greatly retard the cure."

Allis treated these fractures with the elbow fully extended.

In 1894 C. W. Dulles, following the lead of Thomas and Jones, stressed the value of acute flexion.

Ashurst in 1905 utilized acute flexion for reduction and fixation. He used no splints and the wrist was swung from the patient's neck. He claimed that acute flexion brought the coronoid process into contact with humerus which locked the fragments. The sling was removed every three days. The skin in the cubital crease was treated with alcohol and boric acid powder.

At the end of the third week the elbow was extended to the right

angle. Six weeks after the reduction he considered healing completed.

It was his thought that the greatest amount of swelling occurred in the subcutaneous tissues, that the brachial vessels lie close to the joint and were not materially compressed by flexion.

He believed that the locking of the ulna and humerus prevented rotation and preserved the carrying angle. I quote him again: "Supination and pronation are indifferent since the ulna is not involved in these motions."

Ashurst's contention was that a child was more apt to extend from the flexed position than flex from the extended position.

He considered traction in bed unsatisfactory in the extreme (especially for adults).

J. S. Wright (not related) in 1915 described the use of the Lane plate for internal fixation of supracondylar fractures. I quote him: "The absence of an articular surface on the back of the external condyle makes this available for anchoring a very small distal fragment without damaging an articular surface."

Dunlop in 1939, doubting that the Jones position, the position of acute flexion, would prevent the proximal and distal fragments from rotating on each other, described a method of treatment with continuous skin traction. He contended that the fragment ends were so thin and beveled that contact could not be maintained otherwise.

Hart in 1942 described his method of skeletal traction. A Kirschner wire was inserted through the upper end of the shaft of the ulna. Four to six pounds of traction was exerted to reduce overriding and posterior displacement of the distal fragment. Reduction was usually complete in 24 hours.

Today supracondylar fractures are still problems which require as much diligence, perseverance, meticulous handling and determination on the part of the doctor as they did in 1817. Reductions can be as difficult and complications as dangerous.

Of the possible complications, the near 100 per cent preventable Volkmann's ischemic paralysis is the most disastrous. In rare exceptions it is due to the injury but the vast majority of cases could have been prevented. Unfortunately the direct cause can be traced to the management of the injured limb.

If Desault took pains to loosen and tighten dressings as demanded by the swelling, we today must not be too much otherwise engaged to follow his example.

While we regularly use and depend on very much stellate blocks

for relief of the circulatory embarrassment and have been very happy with the results, we are not unmindful that subfascial tension must be relieved by surgery if necessary.

The medial side of the distal end of the humerus is at a lower level than the lateral. A line drawn across the distal end forms a 75° angle with the shaft. Viewed from the side the lower end is seen to form a 45° angle with the shaft. These *must* be restored in the reduction.

With the elbow fully extended the epicondyles and olecranon process are seen to be on a straight line. In the position of 90° of flexion these points form an equilateral triangle. Supracondylar fractures do not disturb these relations. This is an aid in differentiating between supracondylar fractures, fractures of the condyles and elbow dislocations.

There are two types of supracondylar fractures:

(1) The hyperflexion type which is quite unusual and is most often seen in the older age group. In this type of fracture the line extends from before backwards and downward. The distal fragment is displaced forward. In the acutely flexed position the deformity is increased, while traction and full extension reduces and maintains the reduction. Some prefer to immobilize the extremity in full extension, others prefer the 90° position. This type of fracture makes no threat to the vessels in the cubital fossa and is, as a rule, not difficult to handle.

(2) The hyperextension type is a complicated problem and makes a distinct threat to the vessels in the cubital fossa. The line of fracture extends from before backwards and upwards forcing the "razor-like" distal end of proximal fragment into the cubital fossa.

Flexion of the elbow before reduction by traction and manipulation affords a decided chance to do further and sometimes irreparable damage.

This type of fracture is most frequently seen in young children and is the most frequent fracture in the region of the elbow in this age group.

No other frequently encountered fracture carries the likelihood of permanent disability as do the hyperextension supracondylar fractures.

Upon initial examination particular care should be used in determining whether or not there has been circulatory or nerve injury.

We encounter occasionally a case in which the brachial artery is

severed, torn or caught over the distal end of the upper fragment. With obliteration of the circulation the case represents a real surgical emergency and open surgery is imperative.

Accurate reduction must be obtained. Forward displacement of the lower fragment results in permanent limitation of extension and backward displacement of this fragment results in limited flexion of the elbow joint.

The ligaments of the elbow allow free flexion and extension but no lateral motion. Any medial or lateral angulation must take place at the fracture site.

Medial or lateral tilting of the distal fragment produces, if allowed to unite in these positions, permanent cubitus varus or cubitus valgus.

With the promator drawn taut this tilting is corrected and the radial nerve is not stretched over the angulation.

I emphasize reduction of these fractures must be accurate and if not accomplished on the first attempt, the manipulations must be repeated and repeated.

The closed method of treatment consists of:

1. Traction to correct the overriding and to disengage the fragments.

2. Manipulative reduction of the forward or backward displacement of the lower fragment. During this maneuver the forearm should be held, according to Böhler, in acute pronation but most often it will be found that the neutral position is satisfactory. It may be necessary to hyperextend the elbow in order to replace the lower fragment when dealing with the hyperextension type of fracture.

After these two steps, when we are sure of reduction, the elbow is acutely flexed.

The radial pulse must be palpated during the entire process of reduction and especially when the elbow is flexed.

The treatment of these fractures should be based upon:

1. Accurate reduction, as nearly anatomic as possible. There must be no forward nor backward displacement of the lower fragment and no medial nor lateral angulation.

Medial or lateral "offset" do not interfere with good function if the displacement is not too marked. A compromise may be made in those instances.

2. Reduction having been accomplished the limb should be immobilized in as much flexion as the circulation will permit.

Immobilization is to be secured with a posterior molded plaster splint bandaged to the extremity with an elastic dressing. The cubital fossa is not compressed and the bandage is easily loosened if required by an increase of the swelling. The plaster should extend from the axillary fold to the proximal interphalangeal joints. It also should encircle two thirds of the circumference in order to prevent lateral slipping.

The position of acute flexion continues to exert a forward pull on the distal fragment, relaxes the elbow flexors, and relieves tension on the antecubital fossa. This position also tightens the tendon of the triceps to a point where it acts as a posterior internal splint.

The coronoid process of the ulna prevents forward displacement when the elbow is fully flexed and in this position rotation of the lower fragment cannot occur.

The period of immobilization should be only long enough to allow sufficient bony union which is capable of withstanding gentle active motion of the elbow.

The patient should then begin limited, active motion and increase it as rapidly as pain will permit.

No passive motion is to be permitted.

Parents should be forewarned of the possibility of unequal epiphyseal growth even though reduction has been anatomic. An injury capable of producing a supracondylar fracture carries the likelihood of also damaging the growth plate.

The hanging cast has been used for treating these fractures but it cannot assure us that rotation will not occur.

Within the past few years the number of open reductions has markedly increased.

Open reduction has a definite place in the management of supracondylar fractures but should be the exception rather than the rule.

There will be cases in which reduction cannot be accomplished, and fewer in which reduction cannot be maintained. Before open operation is decided upon, skin traction should be given a fair trial. If this is not successful the surgeon's judgment should make the decision as to skeletal traction or open reduction.

There will also be cases brought to us who have already had several unsuccessful attempts at reduction, a period of two days to two weeks having elapsed since the time of the injury. These are very difficult problems and will in a majority of the cases require open reduction.

When open reduction is performed both condyles must be fixed as a "one sided" fixation cannot prevent rotation.

It has been my experience that open reduction of fresh supracondylar fractures is rarely necessary and that if enough effort be exerted on closed reduction it will be found highly satisfactory.

I make a plea that more diligence, perseverance and determination be given the closed method of reduction and that open surgery for supracondylar fractures be used only as a rare exception.

CANCER RESEARCH PROGRAM OF OAK RIDGE INSTITUTE OF NUCLEAR STUDIES

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Last Spring at the Biloxi meeting of The Southeastern Surgical Congress, an announcement was made of the organization of a Medical Division within the Oak Ridge Institute of Nuclear Studies. The specific assignment of the Division was, and is, development of uses and study of the value of radioactive isotopes in treating neoplastic diseases. In addition, in response to demand, a training program in medical uses of radioactive materials has been set up for both preclinical research workers and clinicians.

During the past year, a research laboratory and a 30 bed hospital have been constructed and equipped (fig. 1). A small research staff has been assembled and by July 1, 1950, the program will be in full operation. Because the success of the program will undoubtedly depend on the support it receives from the medical profession within the South, it is essential to point out that any seeming exclusiveness in accepting patients is purely a matter of necessity. It is the particular purpose of this paper to state the mechanisms and policy for admission of patients with certain types of cancer.

Because the facilities in Oak Ridge are limited, every effort must be concentrated on therapy. There would be few things more damaging to the program than to be forced to tell patients, after they arrive, that there is no suitable isotope therapy for their particular neoplasm. The obvious solution is to screen and select the suitable cases near their homes and to admit them as beds become available. To that end, the cooperation of our participating medical schools (Figure 2 and listed later) in each southern state has been secured; by undertaking these separation-funnelling duties they are contributing significantly to the program.

The Oak Ridge Institute of Nuclear Studies

The parent organization of the Medical Division was incorporated in 1946 jointly by 14 Southern Universities as a means of making available to their respective faculties and students the unique instruments and research programs in Oak Ridge. The University membership now is 24. In practice, the Institute carries out a prime contract with the Atomic Energy Commission which outlines the scope of its operations. In the sense that it is a contractor, the Institute can be looked upon as a secondary agency of the Federal

Government, but its activities and policies are formulated independently by a council composed of a representative from each member university. Briefly, when the Atomic Energy Commission invites the Institute to carry on a certain activity, the Institute proceeds to fulfill its contract much along the line a university would take. Since most of the Institute's funds come from its contracts with the Atomic Energy Commission, its business and accounting practice generally follows governmental form.

The Medical Division is only one unit of the Oak Ridge Institute of Nuclear Studies. The Institute also conducts the Atomic Energy Commission Predoctoral Fellowship Program for the entire

Fig. 1. Medical Division Building. This portion houses laboratories, treatment rooms, radiation storage space and offices. A single-story 50 by 150 ft. structure adjoining on the right contains wards and patient facilities.

Fig. 2. Medical schools participating in the ORINS cancer research program.

South; arranges the University-National Laboratory relationship whereby persons may work with the special tools at Oak Ridge; operates the American Museum of Atomic Energy; and directs the Special Training Division, which offers special courses in nuclear physics and chemistry.

To anticipate a point of possible confusion: the Institute does not administer the isotope plants and the pile nor vice versa. Those operations and the work of the Institute proceed under separate contract, each contractor contributing cooperatively to the needs of the Atomic Energy Commission.

The Medical Division

Because it undertakes the practice of medicine, the Medical Division has its own Board of Medical Consultants which directs its scientific and professional efforts. This Board of Medical Consultants was organized by a committee elected by representatives from the 20 Southern Medical Schools who met in the Spring of 1948 to found the Division. The present members of the Board of Consultants are:

1. Wilburt C. Davison, M.D., Dean, School of Medicine, Duke University, Chairman of the Board.

2. George T. Harrell, M.C., Professor of Internal Medicine, Bowman-Gray School of Medicine.

3. Roy Kracke, M.D., Dean, Medical College of Alabama.

4. Vernon W. Lippard, M.D., Dean, School of Medicine, University of Virginia.

5. Douglas H. Sprunt, M.D., Professor of Pathology, College of Medicine, University of Tennessee.

6. Robert B. Taft, M.D., Professor of Radiology, Medical College of State of South Carolina.

The Relation of the Patient to the Research Program

The staff of the Medical Division has been guided by the principle that no patient shall be given experimental isotope therapy if the neoplasm is amenable to effective surgical or x-ray therapy. On the other hand, comparatively little is to be learned from study of moribund patients. It is felt that the necessarily limited facilities ought to be used as productively as possible.

The welfare of the patients takes precedence over every other consideration. Further, a definite effort will be made to create in the patients a feeling that they are a part of the project and are contributing significantly. It has been our experience that few

patients fail to cooperate actively when they are taken into the confidence of the staff. A booklet has been prepared which attempts to outline the most desirable patient-doctor-family relationship. The prospective patient must understand, however, that he will be required to remain in the hospital as long as the content of radioactivity in the tissues or the excretion of activity is potentially hazardous to others.

The Medical Division reserves the right to specify the isotope therapy for each patient. This treatment is under the immediate control of six or more licensed physicians acting with the advice of more than 50 consultants from the Southern Medical Schools. In addition, the staff of the 300 bed, A.C.S.-approved Oak Ridge general hospital, cooperates for consultation and special procedures.

The isotopes used and the dosage and methods of administration will be varied or changed as advances in knowledge indicate. The patients will never be subject to indiscriminate trial of some isotope. In order to obtain isotopes the Medical Division, like every other isotope user, must secure approval of the proposed use and dosage from a Subcommittee on Human Usage. This committee, consisting of 10 men appointed by the Atomic Energy Commission, reviews all requests for use of isotopes in man. In addition, since isotopes fall under the Federal Food, Drug, and Cosmetic Act, Section 505 of the Act must be fully complied with.

The present status of knowledge of isotope therapy does not warrant seting up anything resembling an out-patient clinic for diagnosis or treatment even if the patients were to broadcast but negligible amounts of radioactivity. The patient must understand that he is coming to Oak Ridge for a course of treatment in the hospital.

While many details in the operation of a radioisotope hospital are identical with those in any other hospital, certain points of difference may be noted. For example, visiting may be restricted during the period of therapy. In many respects the "hot" patient is analogous to the contagious patient and contagion precautions from the basis of radioactive precautions, but with 3 important differences: (1) We have instruments of high sensitivity that detect contamination immediately and give an estimate of its intensity. (2) There are no inactivating procedures for radioactivity analogous to autoclaving; one must remove the contamination as a whole or wait for isotopic decay to take place. (3) The radiations from many isotopes penetrate the walls of ordinary containers. Consider, for instance, the problem of how to handle and clean a

bed pan containing radioactive feces and urine, as well as what to do with the contents. Obviously the nurses, technicians, maids, and orderlies must be specially trained to follow radiologically acceptable technics.

Admission of patients to the hospital will be solely through physicians on the staffs of our participating medical schools which at present are as follows:

ALABAMA
Medical College of Alabama, Birmingham

ARKANSAS
School of Medicine, University of Arkansas, Little Rock

GEORGIA
School of Medicine, Emory University, Atlanta
College of Medicine, University of Georgia, Augusta

KANSAS
School of Medicine, University of Kansas, Kansas City

KENTUCKY
School of Medicine, University of Louisville, Louisville

LOUISIANA
School of Medicine, Louisiana State University, New Orleans
School of Medicine, Tulane University, New Orleans

MISSISSIPPI
School of Medicine, University of Mississippi, University

NORTH CAROLINA
Bowman-Gray School of Medicine, Winston-Salem
School of Medicine, Duke University, Durham
School of Medicine, University of North Carolina, Chapel Hill

OKLAHOMA
School of Medicine, University of Oklahoma, Oklahoma City

SOUTH CAROLINA
Medical College of the State of South Carolina, Charleston

TENNESSEE
Meharry Medical School, Nashville
College of Medicine, University of Tennessee, Memphis
School of Medicine, Vanderbilt University, Nashville

TEXAS
School of Medicine, Baylor University, Houston
Medical Branch, University of Texas, Galveston
M. D. Anderson Hospital, University of Texas, Houston
Southwestern Medical College, Dallas

VIRGINIA
Medical College of Virginia, Richmond
School of Medicine, University of Virginia, Charlottesville

Certain staff members of these schools will decide whether the patient is suitable for the work of the Medical Division and whether the therapy being offered may be of some value to the patient. They will make this decision for any patient within their region regardless of whether the patient is one of their own, or is referred or introduced by another physician.

If the patient is suitable and willing to try an unorthodox therapy, the school will communicate with the Medical Division, and as beds become available the patients will be invited to Oak Ridge in the order that the requests for therapy have been received. *There will be no other means of admission to the Medical Division's hospital.* Thus the schools will make the final decision in referring patients for treatment.

Transportation to and from Oak Ridge will be a responsibility of the patient, but there is no cost to the patient for hospital care, professional services, drugs, etc., while a patient in the Medical Division's hospital. Whatever special nursing may be necessary is provided by the Hospital.

The diseases now under study or to be taken up in the next few months are:

(1) Neoplasms of the thyroid which are so located as to be unsuitable for either surgical or radiologic therapy. In most instances this will refer to thyroid metastases.

(2) Chronic myelogenous leukemia in adults. Combinations of isotope therapy with other agents may possibly give beneficial results.

(3) Polycythemia vera responds well to isotope therapy and a number of cases will be accepted at first. This study may be discontinued later to make beds available for newer forms of isotope therapy.

(4) The relatively unknown and rare element gallium appears to localize selectively at sites of rapid bone formation. This suggests a possible use in patients with primary or metastatic osteogenic sarcoma and in other neoplasms with bone metastases of the osteogenic type. This study will be a continuation of work begun at the Navy Medical Research Institute, Bethesda, Maryland.

As a means of maintaining interest and participation of the profession at large, progress reports will be prepared for publication in the state and regional journals. These will briefly summarize the results to date, outline future plans, and note the neoplasms which will be the subject of study in the future. Medical reports have

not been subject to security censorship or other restrictions by the Atomic Energy Commission.

The Hospital is outside the restricted area of Oak Ridge and is most happy to receive professional visitors. The building and equipment were designed and selected with the idea of setting up a model medical radioisotope laboratory. A number of features are worth inspecting if a radioisotope laboratory is being contemplated or designed.

Summary

A hospital has been opened by the Oak Ridge Institute of Nuclear Studies for study and evaluation of radioactive isotopes in the treatment of neoplasia. Points particularly discussed were: The organization behind the hospital, its place in medicine in the South, the diseases to be studied and the means of admitting patients.

POSTOPERATIVE PAROTIDITIS

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ACUTE postoperative parotiditis is an uncommon, nonspecific infection of the parotid gland produced by pyogenic bacteria. Its incidence following major surgical procedures is between 0.04 and 0.74 per cent.[1,2] The mortality rate in patients developing this condition may reach 60 per cent,[3,4] perhaps because it occurs most frequently in elderly people with a lengthy debilitating illness, with severe injuries or infections or marked metabolic changes, or in those who have been subjected to major surgery. However, the parotiditis would seem to be only a contributory cause of death. These people represent the type in whom a delicate balance between life and death exists, a balance easily upset by a complication such as parotiditis. It is hard to conceive that a localized infection, such as parotiditis, could be the true cause of death. It is much more likely that these people die from their primary disease complicated by the additional, poorly tolerated infection of the parotid gland, this latter being the final blow to a patient whose recuperative powers are already weakened.

Etiology: Several theories have been suggested to explain the origin of this disease. Some of these are listed below:

1. The toxin theory, based on the assumption that the gland unsuccessfully attempts to excrete toxins produced by the bacteria of the primary disease.

2. Infection through lymph channels from adjacent inflammation.

3. Degeneration of the gland due to high fever.

4. Infected emboli from the operative site.

5. Following trauma from anesthetist's fingers exerting pressure on the gland.

6. The abdominal reflex theory, based on the supposition that the action of the gustatory nerve is inhibited when a loop of intestine is withdrawn from the abdominal cavity. Rankin and Palmer[2] have emphasized its frequency following operations on the colon and rectum. There was one case of parotiditis in every 135 operations on the colon and rectum at the Mayo Clinic, an incidence 17 times greater than occurred after other general surgical pro-

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cedures. This is an interesting coincidence and may be due to the fact that these are the patients who receive little or nothing by mouth for long periods following surgery, as Rankin suggests.

7. A lack of vitamin A, it is generally agreed, results in an atrophy of epithelial cells.[4,5] When this atrophy occurs in Stensen's duct, a proliferation of basal cells yields a stratified type of keratinized cell in place of the normal columnar epithelium. Such metaplasia may cause at least a partial obstruction of the duct by desquamated cells. This obstruction plus the presence of bacteria may result in an acute parotiditis.[6]

8. Surgical procedures on the reproductive system.

9. The theory of ascending infection from the oral cavity through Stensen's duct. This is conceded to be the method of spread in most instances, although a small number may be hematogenous in origin.[6,7]

Claisse and Dupre[8,9] in 1894 discovered that in normal dogs parotiditis could not be produced by smearing the orifice of Stensen's duct with bacteria, by injecting bacteria into the ducts, or by creating an artificial fistula. However, if the animal was starved or if drugs decreasing the flow of saliva were given to the animal, infection of the parotid gland could be produced by any of these methods.

Based on the experimental work of these authors, Bucknell[10] concluded that the following abnormal conditions must be present for this infection to develop:

1. Bacteria in larger numbers or of a more virulent type must be present at the orifice of Stensen's duct.

2. The general resistance of the subject must be lowered.

3. The quantity of secretion passing down the duct must be diminished, and

4. The quantity and bactericidal proportion of secreted saliva must be lowered.

Pathology: Little of importance has been added to Cruveilhier's original description of the pathology of this condition.[11] Berndt, Buck and Buxton[12] have studied ascending staphylococcus infections in dogs. They found that the ductal system was distended with neutrophiles, which were most numerous in the larger channels. At many points, the walls of the larger ducts were destroyed and the purulent material extended into the surrounding glandular tissue, a periductal exudate of monocytes and lymphocytes.

In the human, histologic studies of suppurative parotiditis by Custer[13] and Nicol[14] showed that the process was limited to the larger ducts which are lined by cylindrical cells. The smaller ducts,

lined by cuboidal epithelium, were never involved. The infection did not pass through the entire ductal system, but after it had destroyed the epithelial lining, the infection was found to penetrate the walls of the larger and medium sized ducts only. At this point, the infection involved the glandular tissue. In more advanced stages, abscesses were centered around the larger radicals. Where the duct lining was intact, periductal necrosis and infiltration were minimal.

Material: During the period from January, 1946, to July, 1949, I have seen 10 cases of acute postoperative parotiditis on the surgical wards of the Boston City Hospital. Table I summarizes these 10 cases.

The average age of this group was 64.2 years, the youngest being 24 years of age, the oldest 96 years. With the exception of the youngest patient, all were over 45 years of age. The infection involved the right gland in 5 instances, the left in 3 instances and occurred bilaterally in 2 patients. In this series, this complication appeared suddenly from the 3rd to the 21st postoperative day. The patients complained of pain in the temperomandibular joint and discomfort on opening and closing the jaws. Within a few hours after this symptom developed, a sharp elevation in temperature, pulse and leukocyte count was discovered. The average temperature was 102.2 degrees, the average pulse 120 per minute and the average white blood count 18,200.

It is imperative that both glands be carefully examined at this time in order not to overlook a slight swelling indicating early involvement of the opposite gland.

The orifice of Stensen's duct was pouting and injected, and purulent material was expressed from the duct and cultured in all instances. In 9 cases, the predominating organism was hemolytic staphylococcus aureus and this was the only organism found in 4 cases. Hemolytic streptococcus appeared to predominate in the remaining case. A polybacterial infection was present in 6 cases and the organisms obtained included non-hemolytic staphylococcus, streptococcus viridans, non-hemolytic streptococcus, non-hemolytic staphylococcus aureus, N. catarrhalis, diptheroids and Bacillus proteus.

As in other series,[2,6,7] most of the patients are in the upper age brackets. They all had serious disease. In no instance was their immediate postoperative condition classified as excellent by the ward surgeon. In describing the mouth, the words "dirty," "carious," "dry," "foul," and "pyorrhea" were used by the examining physician. Furthermore, these patients all took fluids by

Age	*Sex*	*Diagnosis*	*Postop. Condition*	*Postop. Side*	*Postop. Day*	*Treatment*	*Result*	*Comment*
70	M	Fracture, neck of right femur (nailed). Generalized Arteriosclerosis. Senile Dementia.	Poor	R	21	X-ray; 100 r per day for 3 days. Sulfathiazole in full doses.	Cleared	Poor preoperative condition with T to 102° on occasions—disoriented and restrained postoperatively. Small intake by mouth—maintained on intravenous fluids for 3-4 weeks. Patient died 60th postoperative day.
24	F	Chronic Cholecystitis (Cholecystectomy, Appendectomy). Lobar Pneumonia, terminal.	Good	R	3	X-ray; 100 r per day for 3 days. Sulfathiazole in full doses. Incision and drainage of abscess.	Cleared	Small amounts of fluid by mouth—repeated nausea and vomiting. Abscess ruptured into external auditory canal. Patient died on 40th postoperative day.
70	F	Advanced Abdominal Carcinomatosis (Exploratory Laparotomy). Secondary Anemia.	Poor	L	19	X-ray; 150 r per day for 3 days.	Cleared	Took fluids poorly throughout by mouth. Patient eviscerated on 16th postoperative day, died on the 24th postoperative day.
53	M	Squamous Cell Carcinoma of Urinary Bladder (Partial Cystectomy)	Poor	Bilateral	11	Radium. Sulfadiazine.	Cleared	Fed entirely by vein. Died on 15th postoperative day.
89	F	Fracture, Neck of right femur	Fair	L	5	Radium.	No change in gland	Patient died 8th postoperative day.
58	F	Carcinoma of the Cecum (inoperable). Postoperative Cecostomy. Ileotransverse Colostomy.	Good	Bilateral	7	X-ray; 150 r per day for 3 days.	Abscess formation	Patient died on the 11th postoperative day.
62	F	Acute and Chronic Cholecystitis and Cholelithiasis (Cholecystectomy).	Good	R	6	Radium. Sulfadiazine.	Cleared	Discharged.
46	F	Carcinoma of left breast (Radical Mastectomy).	Good	L	6	Radium.	Cleared	Discharged.
74	F	Fracture, Neck of left femur (nailed). Generalized arteriosclerosis and arteriosclerotic Heart Disease.	Poor	R	10	Penicillin—100,000 units every 3 hours. Lugol's solution.	Cleared	Discharged.
96	F	Fracture, neck of left femur (nailed). Generalized arteriosclerosis and Arteriosclerotic Heart Disease. Malnutrition. Multiple Vitamin Deficiencies.	Poor	R	5	Penicillin—100,000 units every 3 hours. Lugol's solution.	Cleared	Discharged 274 days postoperatively.

mouth poorly and were maintained for varying periods on intravenous fluids alone, with the consequent lack of stimulation of the salivary glands. The mortality rate in this Boston City Hospital series is 60 per cent.

Several interesting facts are not shown in Table I. All of these patients had poor oral hygiene. In every case dental caries was marked. This poor oral hygiene has been a common factor in reports by many investigators.[2,6] The mouth may be dirty because of dehydration,[10] suppression of salivary secretions, dental caries and pyorrhea, sustained mouth breathing, or failure to ingest sufficient fluids. Rolleston and Oliver[15] found that parotiditis occurred ten times more often in cases of peptic ulcer treated by oral starvation than in patients who were allowed water by mouth.

Treatment: The best form of treatment is a prophylactic one, based on the surgeon's awareness that this disease occurs in older, poor-risk patients with dirty mouths who have been ill for a long time, or who are expected to have a lengthy and difficult convalescence. If elective surgery is contemplated, these patients should have their mouth and teeth cared for by a competent dentist, their general condition bettered by an adequate diet, by high vitamin therapy with particular attention to vitamin A and, if necessary, by intravenous fluids and by blood transfusions. Adequate fluid intake by mouth should be maintained. Good nursing care, with particular attention to mouth care and frequent mouth washes, plays an essential role in lowering the incidence of parotiditis. As in all elective surgery, the patient should be brought to the operating table in the best possible general condition and with particular attention being paid to his oral hygiene and his state of hydration. Hard candy, gum chewing and flushing with sour liquids are beneficial, and will stimulate salivary flow.

Early diagnosis and the early institution of proper treatment are quite important in preventing this disease from going on to abscess formation and necrosis. Once the parotid has become infected, one should continue to attend to the condition of the mouth, but one should also realize that conservative treatment must be abandoned. I feel that hot or cold compresses or packs are a waste of valuable time and that a large number so treated will go on to necrosis and abscess formation, and that the morbidity and perhaps the mortality will be higher if these conservative measures alone are maintained. Definite treatment should be instituted at once, for the earlier this is begun the better the results that may be expected.

Rankin and Palmer[2] and others[16,17] advocate radium treatment of these infected glands and the results in large series so treated are

good. This treatment is, however, expensive and inconvenient for the patient. Radium treatment requires the full cooperation of the patient, which cannot always be obtained from these seriously ill patients. At the series here reported 400 millicuries of radium are applied for one hour through a 2 mm. brass filter at a distance of 1 cm. from the skin. This is repeated one time.

Robinson and Spencer[18] and Hodges[19] did much to popularize the x-ray treatment of this disease. I prefer x-ray to radium in the treatment of this disease because x-ray is relatively inexpensive, does not require the patient's cooperation, causes him little inconvenience and gives a more uniform dose to the diseased tissue. One hundred and twenty-five K.V. with a filter of 3 mm. of aluminum through a portal 10 cm. square are applied at a distance of 30 cm. to cover the entire parotid gland. Two hundred roentgens daily for two or three days are given.

There is usually an increase in pain and a temperature rise for a few hours following the first treatment and for twenty-four hours after beginning this treatment there may be an increased swelling of the gland. These findings may be so marked that the surgeon may lose confidence in radiation therapy at this point. Following this short period, the gland gradually decreases in size within the next seven to fourteen days. However, there is a sudden cessation of the severe general intoxication during the first or second day after the first treatment. Hare[20] has pointed out how necessary it is to allow radium or x-ray 48 hours at least to attain its maximum effectiveness. If this advice is followed, many cases will be spared unnecessary surgery.

The effect of x-ray or radium on the inflamed gland is similar to the effect on all inflamed tissue. Desjardins[21] feels that the beneficial results are due to direct action of the rays on the infiltrating leukocytes, particularly their disintegrating effect on the lymphocytes with a consequent release of protective antibodies which tend to neutralize the toxic products of the bacteria concerned. If x-ray or radium is used early, it may abort the process completely, may quickly localize the infection, and may even promote drainage through the duct. When radiation is used later in the course of parotiditis it may cause a similar localization or may have no effect. According to Buschke and Cantrill,[22] where roentgen therapy is successful the infection is destroyed before it breaks through the walls of the larger ducts. These men showed that from 68 to 75 per cent of cases treated by x-ray showed a regression of the disease and 15 per cent of the patients recovered but developed localized suppuration which spontaneously perforated or had to be surgically

drained. From 11 to 17 per cent of these x-ray treated patients died with their parotiditis uncontrolled.

Dilatation of the ducts in cases of ascending infection has been proposed and used by Hobbs and Sneierson.[23] They never use this method in hematogenous infections. I find it impossible to make this distinction between a parotiditis due to an ascending infection and a hematogenous infection with any degree of certainty. Of 56 cases reported by Coughlin and Gish,[24] only one case was definitely due to stone in the main duct. Furthermore, dilating Stensen's duct in a fulminating type of parotiditis, to my mind, requires the utmost caution and may be a dangerous procedure. In the rare instances where frank obstruction of the duct is present, however, dilatation may well be the treatment of choice.

More recently, large doses of Lugol's solution have been used with excellent results.[25] Lugol's solution probably acts as a bacteriostatic agent when the concentration of iodine in the blood passing through the parotid gland and in the saliva is high. It is well known that the iodine of Lugol's solution is easily absorbed into the circulatory system and excreted by the salivary glands, regardless of the route of administration. Salivary secretion is enhanced by this iodine. This latter is a salutatory action since a suppression of this function is commonly present in postoperative parotiditis.

As the iodine is eliminated by the parotids, it is quickly reabsorbed in the intestinal tract and excreted again by the gland. This cycle continues until the final elimination of the drug by the kidneys, which may occur from 48 hours to several days after ingestion.

This treatment has been used on two of the Boston City Hospital cases. Both of these patients, however, were receiving large doses of penicillin simultaneously. In both cases, the greater part of the Lugol's solution was given by mouth, 20 minims being given every 3 hours, although in each instance 60 minims of the daily dose was given intravenously along with 1500 c.c. of normal saline solution. Each patient was treated for four consecutive days: each patient received 880 minims of Lugol's solution. Both patients so treated recovered.

In the future, this condition should occur less frequently because so many surgical patients are now being given penicillin for short periods before surgery and are being maintained on this drug during the early postoperative period. In the majority of instances, the pyogenic organisms causing the infection are sensitive to penicillin. However, parotiditis developed in cases 9 and 10 of this series while the patients were receiving 100,000 units of penicillin every 3 hours. This would lead one to believe that while penicillin

may decrease the incidence of this disease because it is now being given routinely to certain cases before and after surgery, and while it may reduce the morbidity considerably, it will not prevent the development of this complication.

Three patients in this series were treated with sulfonamides and x-ray, and two with sulfonamides and radium. Kelly's[26] observations on the treatment of gas gangrene seem to indicate that there is an antagonism between x-rays and sulfonamides at least in the treatment of gas gangrene. Is it possible that such an antagonism may exist between these two forms of radiation and the sulfa derivatives? The five patients treated by sulfonamides and some form of radiation in this series died, but because of the small number of cases this fact is of speculative but not statistical significance. If a true antagonism does exist, the sulfa drugs may be not only unnecessary but even harmful in the treatment of this condition. Perhaps these drugs should not be administered to patients who are receiving radiation therapy for parotiditis unless definite indications for their use are present.

This gland is covered by fascia derived from the cervical fascia, which splits into an external and internal layer at the cephalad portion of the parotid gland, thereby forming an unyielding envelope with a weak point in the region of the auditory canal and another weak area where the layers again join the cervical fascia at the caudad border of the gland. This capsule is closely applied to the gland and bound to it by many fascial septa. This unyielding capsule accounts for the elevated pressure occurring with acute inflammation. The tension thus created may quickly cut off the venous circulation with resultant early gangrene. This pressure elevation may temporarily damage the facial nerve, a damage which quickly disappears when the tension is relieved, or may completely and permanently destroy its function.

Because of these features, some men[2-3] feel that incision and drainage should be carried out early. I feel that the temptation to incise and drain these glands should be resisted until definite fluctuation can be clearly discerned. Until the time that an abscess can be made out clearly, the early institution of the other means of therapy previously mentioned—particularly irradiation, penicillin and Lugol's solution—as well as the general measures discussed earlier, will result in a very small percentage of abscesses. If it is at all possible, then, incision should be avoided. Unsightly scars may follow hasty or poorly planned surgery. Facial nerve injury, fistula formation and secondary infection may be other undesirable sequellae. The gland is usually bilobed, and although the facial

nerve commonly lies between these lobes,[27] this may not always be so.[28] By this variance, as well as the varied pattern of the branches of the nerve, injury may follow anything less than meticulous surgery.

Because of these dangers, Leithauser and Cantor[25] never incise the gland, even if an abscess forms. These men aspirate the pus daily through a large caliber needle. They feel that these abscesses are usually multiple and discreet due to multiple areas of pressure necrosis. According to these authors, adequate drainage is seldom accomplished by incision. Although I have had no experience with multiple needle puncture aspirations, it seems that when the indications for surgery—abscess formation with fluctuation or failure on other forms of therapy—are present, the principle of adequate incision and wide drainage should be carried out as in all other localized abscesses, paying particular attention to the facial nerve and its branches. It seems probable that incision and drainage will be indicated rarely. But when definite indications are present, one should not hesitate to carry out this procedure to produce an adequate exit for the trapped purulent material.

If surgery is selected, and it will be necessary only in rare instances, the incision described by Blair and Padgett[4] and Fisher[29] are particularly satisfactory from the viewpoint of drainage, safety of the facial nerve and cosmetic result.

The least vascular portion of the gland lies close to the ear, and surgical incisions have been planned to take advantage of this fact. The capsule only is incised and separated from the gland, so that the whole presenting surface of the gland is exposed. Blunt scissors are then thrust into the gland and spread as they are withdrawn. A rubber drain is placed between the capsule and the gland, and the wound is left open.

Summary

Acute postoperative parotiditis is a nonspecific pyogenic infection of the parotid gland, usually the result of an ascending infection by way of Stensen's duct.

Ten personally observed cases are reported.

The predominating organism in these cases was hemolytic staphylococcus aureus, although a polybacterial infection was present in 6 cases.

The best treatment is prophylaxis. The various types of treatment are discussed, and early treatment is emphasized.

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CARCINOMA OF THE CORPUS UTERI

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CARCINOMA of the fundus is essentially a postmenopausal disease. When considered with carcinoma of the cervix, comparative reports from the various clinics differ widely. For instance, the Memorial Hospital in New York reports a ratio of 1 to 4; the Howard A. Kelly Hospital in Baltimore 1 to 14; other clinics report percentages in between. The early recognition of the disease is, of course, the most important factor. The presence of other associated lesions such as fibroids, polyps, or postmenopausal vaginitis with similar symptoms may cloud the picture and may delay the final diagnosis, but they should not deter us from completely eliminating the possibility of endometrial carcinoma. Carcinoma of the fundus is at first a localized endometrial growth. In the majority of cases its progress is by direct extension, and distant involvement is slow. The disease can be recognized early and effective treatment established. In contrast with carcinoma of the cervix, fundal carcinoma can be attacked before distant metastases have occurred. While it is not within the scope of this paper to enter into controversial issues regarding the histologic pathology, estrogenic influences and methods of treatment, it is our purpose to present the salient factors and views which enter into the recognition, diagnosis, and treatment of this disease.

Admittedly the best results obtained in the treatment of cancer anywhere in the body lie in the early recognition of the disease. Since bleeding is the one outstanding symptom of cancer of the uterus, and since this disease is most prevalent at the time of the menopause, irregular bleeding occurring at that time may be interpreted by the patient as nothing abnormal and may even be passed up without further concern. The transition from a normal menstrual flow to the pathologic bleeding is gradual. We are often impressed with the seeming disregard with which women interpret abnormal bleeding, particularly at the menopause. Many women believe that the menopause is associated with increased bleeding or, more often, that increased bleeding foreshadows the menopause. In cancer of the uterus, the periods may be increased in duration, increased in volume, or increased in frequency. Since each patient presents a menstrual history characteristic to herself, any deviation from her personal routine should be studied and no abnormal bleeding should ever be permitted to continue unexplained. Leukorrheal

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discharge may or may not be associated with metrorrhagia. When present, it is usually serosanguineous, but scant at the onset. Later the discharge becomes foul, profuse and irritating. Pain is usually present only in advanced cases and is reflected by the areas involved. While carcinoma of the uterus may be encountered at any age during the menstrual history, the largest number of cases reported from the various clinics place the age as between 50 and 60; occasionally a case is reported in the early twenties or as late as the 86th year.

Diagnosis

Because of the close relationship which exists histologically between postmenopausal hyperplasia of the endometrium and carcinoma of the endometrium, they should be studied together. Postmenopausal hyperplasia is now recognized as a definite clinical and pathologic entity. Some observers, notably Novak, have attempted to trace progressively in orderly sequence the histologic pattern from endometrial hyperplasia of the postmenopausal type to endometrial carcinoma. Atypical endometrial hyperplasia may for academic purposes be regarded as an intermediate stage. It is encountered with sufficient frequency for some observers, like Hoffman and Scheffey, to suggest the term "carcinoid hyperplasia" as descriptive of this intermediate stage. There are microscopic pictures which represent the higher grades of hyperplasia which are practically indistinguishable from adenoma malignum. The gynecologic pathologist could interpret this particular pattern on either side of the fence. This similarity is responsible for the theory that adenocarcinoma of the endometrium follows directly upon postmenopausal hyperplasia. Leaders in this controversy are Novak who favors this postulation and TeLinde who maintains that "The importance of postmenopausal endometrial hyperplasia lies in differentiating it microscopically from the least malignant of the endometrial carcinomas, and in its possible etiological relationship to endometrial cancer." This relationship is of further importance because of the recent studies bearing on the direct influence of estrogenic activity as a potent factor in the causation of endometrial cancer. That estrogens, whether natural or synthetic, produce hyperplasia of the endometrium is no longer questioned. The effect of this influence on the endometrium is further emphasized by the presence of hyperplasia in granulosa cell tumors and theca cell tumors; an observation directed towards endocrine-tumor relationships. Gusberg believes that this influence is strong enough to produce "Adenocarcinoma of the human endometrium following prolonged estrogen administration." He again made the interesting observation that women who had received irradiation therapy

for menopausal bleeding developed corpus carcinoma nearly four times as frequently as those women not so exposed. Sufficient evidence is lacking for the conclusive and incontrovertible proof that the administration of estrogens properly controlled initiates a process which later ends up as fundal carcinoma. Until further work is undertaken and until we possess more accurate methods of determining the effects of estrogenic influence on the human endometrium, caution should be exercised in the administration of massive doses of estrogens.

Pathology and Prognosis:

The predominant pattern of carcinoma of the endometrium is that of adenocarcinoma. In studying several sections from a given tumor one or more patterns may be encountered but there is always a predominant picture which places it in a given category. For years four different patterns have been recognized and tumors classified according to each particular pattern. Gynecologic pathologists may differ as to the exact category in which a certain pattern should be placed but this difference is relative and close enough for classifications. Of the established classifications, Ewing's is perhaps the most widely followed: (1) Malignant adenoma. This is by far the most common type encountered. This is the picture of greatly enlarged and elongated alveoli, lined by several types of cuboidal and cylindrical cells. Healy and Cutler refer to this type as *papillary adenoma malignum*. And in Mahle's, which corresponds to Broder's classification of squamous cell carcinoma, this would be represented by Grade I. The cells show a high degree of differentiation and is by far the least malignant. (2) Papillary adenocarcinoma. This form arises in superficial cells and there is predominance of secondary differentiation throughout and occasionally primary differentiation. This is the adenoma malignum of Healy and Cutler and of Grade II in Mahle's classification. (3) Alveolar carcinoma. Rare, solid masses of cells joining alveoli and smaller cell groups infiltrating spaces and vessels; carcinoma composed predominantly of undifferentiated cells, although some areas show some primary differentiation, and occasional areas show secondary differentiation. According to Healy and Cutler tumor cells forming solid masses, strands and cords, and Grade III in Mahle's clasification. (4) Adeno-acanthoma wherein squamous cells form a prominent element in adenocarcinoma, and occasionally predominate over the glandular structure. Diffuse anaplastic carcinoma in Healy and Cutler and Grade IV in Mahle's classification. Highly malignant; cells show no differentiation throughout the tumor although occasional areas may show some primary differentiation.

The gradation of these tumors is not a simple matter as one or more, and sometimes all, patterns may be encountered in the same tumor depending upon what part of the tumor the section has been taken. The Jefferson Clinic has adopted a more generous classification which seems less confusing, namely: low, intermediate and high grades of malignancy. For the past few years Trout and Papanicoleau have encouraged the investigation of endometrial cancer by the diagnosis of malignant cells in the vaginal smears. The method is excellent but it is still early for universal adoption because even experienced cytologists are not in agreement in their interpretation of cancer cells. Certainly it would be unwise to defer treatment on a patient with negative smears but with clinical evidences of malignancy. In the average clinic, the diagnosis is made more certain by direct and thorough curettage of the endometrium.

Considerable time has been devoted in this paper to the histologic classification of fundal carcinoma. It is important because the prognosis and treatment bear a direct ratio to the histologic pattern. It is generally recognized that the course of clinical malignancy runs parallel to the degree of histologic malignancy. Regardless of the method of treatment used, the percentage of 5 year salvages is greatest in Group I and least in Group IV. This parallelism is true whether reports are gathered from the larger clinics or from individual operators.

Because of anatomic peculiarities, surgery has offered the preferred method of treatment for carcinoma of the body of the uterus. It is now established that abdominal complete hysterectomy with bilateral salpingo-oophorectomy offers the best approach. Some clinics prefer to combine this surgical procedure with irradiation. At Johns Hopkins, intra-uterine irradiation of 4,000 to 8,000 mg. hours of radium is followed by a full course of roentgen irradiation and six weeks later total hysterectomy is performed. The Jefferson Clinic prefers to insert radium immediately following curettage and if the diagnosis is positive for malignancy, it is allowed to remain until the dosage of 5,000 mg. hours is completed; this is followed by total hysterectomy and bilateral salpingo-oophorectomy six to ten weeks later. The University of Michigan prefers roentgen irradiation followed by surgery.

When the uterus is regular in outline, freely movable, with no apparent involvement of the adnexa, in other words, when there are no evidences of extension of the disease beyond its local limits, the results obtained with surgery alone are quite striking. We have employed this method in our clinic, and the five year survivals are encouraging. The problem arises when extension of the disease has

progressed beyond its local boundaries or has already invaded distant tissues, and then the percentage of five year salvage is markedly decreased. It is here that intensive radiation should be given. In those cases where irradiation was carried out before operation, it was not uncommon to find active-looking carcinoma cells in patients who had received 3,000 to 4,000 mg. hours of radium; this probably explains the imperfect results when that amount of radium alone was used. Arneson reports 88 per cent five year survival and no evidences of residual tumor when multiple sources of radium were used, and hysterectomy followed.

As mentioned above, while our series are relatively small compared with the larger clinics we have been impressed with the five year survival rate in patients with carcinoma of the fundus who were subjected to complete abdominal hysterectomy and bilateral salpingo-oophorectomy alone. We had no operative mortality in the series. We believe that with the current refinements of anesthesia and operative technics, this percentage will be improved. The excellent work which is being done by individual observers elsewhere will do much to clear up in the future the sources of our present difficulties, and when the next tabulation is presented we shall be in a better position to evaluate the effectiveness of a particular method. In the meantime, we must rely on an early and accurate diagnosis and the institution of prompt treatment in accordance with whatever method in our hands has produced the best results.

DEGENERATIVE CHANGES IN THE CERVICAL SPINE AS A COMMON CAUSE OF SHOULDER AND ARM PAIN*

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PAIN and soreness in the region of the shoulder girdle, chest, and upper extremity is one of the frequent causes for which the physician is consulted. In the past it has been the tendency of the profession to interpret these complaints as due to some local disease process, the most common diagnoses being bursitis, neuritis, local arthritis, periarticular fibrositis, pleurisy, and in some instances coronary heart disease. Careful investigation of these complaints has revealed that local lesions very rarely are responsible for the symptoms, but rather that the primary cause is a lesion of the cervical spine compressing one or more of the cervical nerve roots with pain referred to the area mentioned above. There are numerous lesions of the cervical spine that may manifest themselves by nerve root pain. Degenerative change, or so called "degenerative arthritis," is by far the most frequent. Of 123 consecutive cases of cervical nerve root pain degenerative arthritis was the causative agent in 75. In 66 of these the involvement was below the fourth cervical interspace. This explains the more frequent occurrences of symptoms about the shoulder and upper extremity. There were 78 patients in this group who complained of pain referred to the shoulder girdle, chest or arm. Degenerative arthritis was present in 84-7 per cent, or 66 of these cases.

A review of the literature reveals that attention was first called to the cervical spine as a cause for shoulder and chest pain by Nathan in 1916. This report followed the experimental production of arthritis in the cervical vertebrae. It was not until about twenty years later that much emphasis was placed on the cervical spine in the consideration of the etiology of arm and shoulder pain. In 1934 Nachlas reported arthritic changes in the cervical spine as a cause of precordial pain. He pointed out that this could be confused with angina pectoris and described the mechanism of the production of the pain. Two years later Hanflig reported 30 cases with pain in the shoulder and arm that had resulted from cervical spine arthritis. Oppenheimer reported 72 cases in 1937, with a complaint of pain in the shoulder. Sixty-six of these had narrowing of the cervical intervertebral foramina. More recently a number of authors have noted

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the arthritic changes in the lower cervical vertebrae, but they have attributed the symptoms to compression of the nerve roots by a herniation of the nucleus pulposus rather than to the arthritic changes.[3,4,9,10]

In order to understand the pathologic physiology that is responsible for the production of root pain in the cervical spine, the knowledge of its anatomic characteristics is of vital importance. The

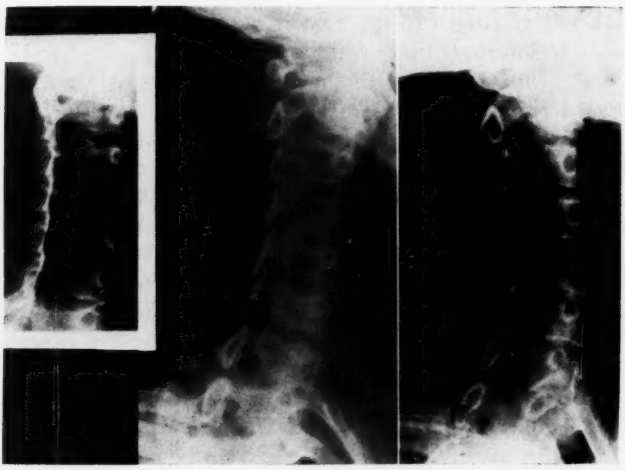

Fig. 1. (a) Oval foramina. (b) Oblong foramina showing long vertical and short horizontal diameters. (c) Oblong foramina showing how osteophytes bulging into the foramen produce a constriction.

structure of the spinal canal in this region, its contents, and the intervertebral foramina is such that relatively mild changes will produce some nerve root irritation. These characteristically involve both the nerve and bony structures. The spinal cord and nerve roots more nearly fill the canal and intervertebral foramina in the cervical spine than they do in either the thoracic or the lumbar regions. The nerve roots come off from the spinal cord at right angles, passing directly over the intervertebral disc. They immediately pass through the dura and into the intervertebral foramen. In addition the cord is anchored to the dura on both sides by the dentate ligament. This fixation of the cord and the short course of the nerve roots in the canal makes them relatively immobile and more susceptible to trauma. The intervertebral foramen through which the nerve roots pass vary in shape and size from nearly oval to the pronounced oblong type (fig. 1). The latter is the more common and has a long vertical and narrow horizontal or anteroposterior

diameter. The anterior wall of the foramen is formed by the posterolateral edge of the bodies of the two adjacent vertebrae with the intervertebral disc interposed between them. The posterior wall is formed by the apophyseal articulation. This joint is placed so that the superior articular facet forms the inferior three fourths of this wall and the base of the inferior facet forms the superior

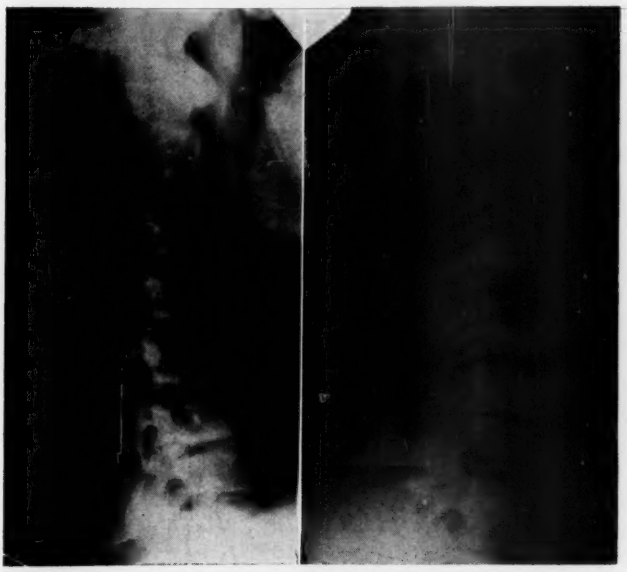

Fig. 2. Lateral views showing loss of normal curve and narrowing of the intervertebral disc between the sixth and seventh cervical vertebrae.

one fourth. The pedicles of the adjacent vertebrae form the superior and inferior walls. The line of the apophyseal joint is in the lateral plane, running from posterior to anterior and superiorly at an angle of approximately forty-five degrees. Thus when the neck is hyperextended, the inferior facet slides upward and forward, with the result that the foramen is narrowed both in its horizontal and vertical plane. This narrowing may be sufficient to produce some nerve root irritation in the oblong type of foramen. Likely this is the mechanism of the production of pain in the so-called whip lash injury as described by Davis.

The anatomy of the bony structure of the cervical spine, as described above, is such that it allows free mobility in all directions; this motion being limited only by the capsular ligaments. Therefore, these ligaments, by reason of their vulnerability are frequently

damaged. The injury may be the result of mild trauma that is associated with the usual wear and tear of daily life, such as jerking or suddenly turning the head, or it may follow a single more severe trauma. In most instances, the individual is not aware of anything

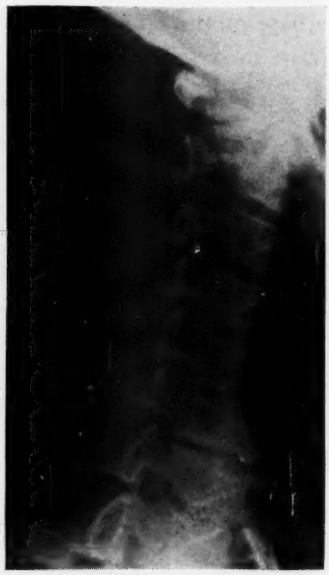

Fig. 3. Oblique view of same case as Figure 2 showing the constriction of the intervertebral foramen by posterior osteophytes.

having taken place at the time. However, years later, usually after the age of 40 years, symptoms will appear. Investigation at this time will reveal a degenerative type of arthritis. The maturity of such changes indicates that they have been present for several years. These changes manifest themselves by narrowing of the intervertebral disc, marginal lipping, and spur formation both anteriorly and posteriorly (figs. 2 and 3). The mechanism of this pathology has been demonstrated by Keyes and Compere. The posterior spurs or osteophytes bulge into the intervertebral foramen narrowing its horizontal diameter directly anterior to the nerve root. This change alone may encroach on the nerve root sufficiently to produce irritation or compression. The lesion may be localized to one vertebra, but more frequently it will be found to be multiple (figs. 4 and 5). If these changes are complicated by a herniation of the nucleus pulposus, the compression will be much greater and the symptoms more definite. Spurling, Semmes and Murphy and others feel that the herniation alone causes the root pain in most of these

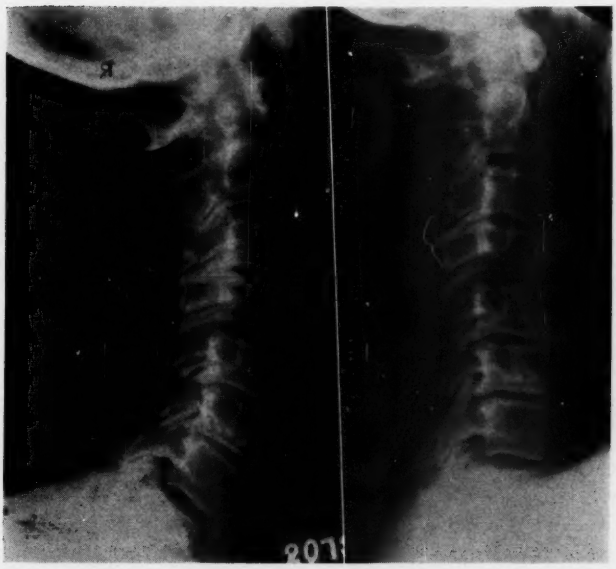

Fig. 4. Lateral view showing narrowing of several intervertebral discs and abnormal flexion.

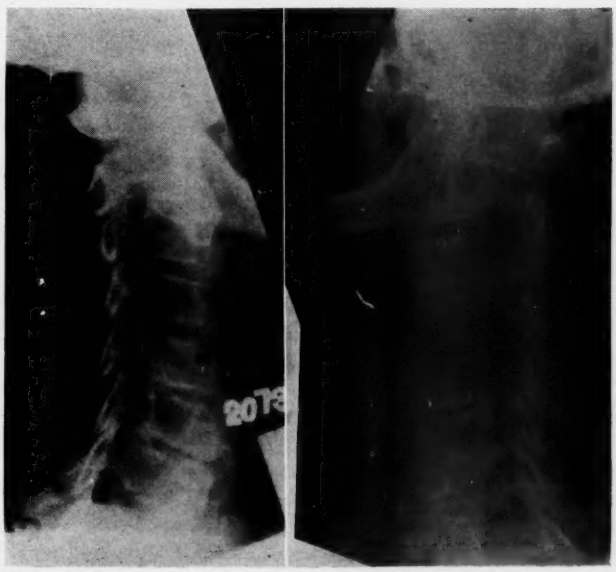

Fig. 5. Oblique views of same case as Figure 4 showing constriction of multiple intervertebral foramina by posterior osteophytes.

cases. Our findings are not in accord with this observation. A careful analysis of the 75 cases with degenerative changes in the cervical spine revealed only 7 cases in which a definite diagnosis of herniated nucleus pulposus could be made. This diagnosis was based on the localized segmental distribution of the pain associated with some motor weakness, hypesthesia, and decreased reflexes. Other degenerative changes, such as narrowing of the apophyseal joints with osteophyte formation may produce narrowing of the intervertebral foramina. In addition the narrowing of the intervertebral disc produces some forward subluxation of the inferior articular facets with narrowing of the foramen. Each of these conditions alone, or in combination, may produce enough narrowing to encroach upon the nerve root.

Mild symptoms, such as an occasional crick and soreness in the neck, may persist for a long time. Then some trivial injury may be followed by pain in the shoulder girdle, precordium, or upper extremity without any increase in the neck symptoms. For this reason, it is not infrequent that no thought is given to the cervical spine as the cause of the trouble until one fails to get any response to local treatment. The usual presenting symptom is pain that is localized to one or more areas, depending on how many nerve roots are involved. This pain may be localized between the scapulae at the base of the cervical spine extending as far down as the rhomboid area, on top of the shoulder or down either the front or back of the arm to the forearm and hand. Usually the hand symptom is a generalized numbness rather than pain. Precordial pain may be associated with the shoulder and arm pain. Nachlas has explained this on the basis that protopathic fibers arising from the sixth and seventh cervical and the first thoracic nerves accompany the motor nerves to the anterior and lateral chest walls. This pain is usually diffuse and not severe; however, it may be of such severity as to be confused with that of coronary heart disease. Four of our patients presented such symptoms. Occipital pain, earache, and even a migraine headache will be present in cases where the upper cervical spine is involved. This syndrome has been described by Jackson. The pain is more often bilateral and involves several areas, though it is worse in one localized area in nearly all cases. It is usually more pronounced at night. There may be some difficulty in getting to sleep, but more often the patient is awakened during the night and is unable to find a comfortable position. It may be necessary to get out of bed and walk around before relief can be obtained. Coughing or sneezing rarely causes an accentuation of the root pain, though it may cause an increase in the neck pain. The reduplication of root pain on coughing or sneezing is always suggestive of a rup-

tured intervertebral disc. Sudden turning or jerking of the head may produce a sharp stabbing pain in the dermatome supplied by the involved nerve root. Mild activity usually will be accompanied by some relief.

The physical findings are few and not very marked. There is usually some tenderness along the sides of the neck directly over the nerve roots. This is generalized in most instances but may be localized when the irritation or compression is limited to a single nerve root. There is a loss of the normal lordotic curve of the neck in most instances. This is the result of the patient's attempt to increase the space in the intervertebral foramen. Forced hyperextension often produces a sharp, radicular pain as a result of encroachment on the nerve root by the subluxated facet when the spine is in this position. Rarely does one find sensory changes; however, there may be some hypesthesia in the presence of a ruptured disc. There may occur some spasm of the neck and shoulder girdle muscles as a result of the irritated nerve endings. The spasm is often associated with trigger point tenderness, the most common location for this finding is in the dermatome of the posterior division of the fifth and sixth nerve root. Limitation of motion in the shoulder will be present if the spasm has persisted for some time. This finding most often confuses the picture, especially if other findings are only of a mild degree. The head tilt compression test as described by Spurling has been a variable and an inconsistent finding in our cases.

The roentgenogram produces the most significant findings. The normal forward curve is lost or diminished in most instances (figs. 2 and 4). This is significant in that it indicates an attempt to prevent impingement of the cervical nerve root which is more likely to occur with the spine in the normal hyperextension. Films taken in forward flexion will often reveal a loss of flexion in the lower cervical vertebrae and an increased flexion in the joint just above this area (fig. 2). Davis and Jackson have placed emphasis on this subluxation as a cause of symptoms. It is our opinion that this increased local motion is of no significance in itself. This is the same condition that occurs in the lower spine when there is loss of lateral and forward motion in the lumbosacral joint with increased motion above this joint. It is felt that in the presence of fixation in one joint, there will be an increase in joint motion above this to compensate for the loss of motion. The symptoms in cervical spine, in most instances, will be localized to the nerve roots corresponding to the joints below the apparent subluxation. There is practically always some bony narrowing of the intervertebral foramina. This is produced by osteophytes or spurs along the posterior surface of the

intervertebral joints and the margins of the apophyseal joints that bulge into the foramina. These changes are accompanied by a narrowing of the intervertebral disc in most instances. This narrowing allows some forward subluxation of the inferior facet. These changes may produce marked constrictions of the intervertebral foramina (fig. 5). Some authors have felt that the narrowing of the intervertebral disc is indicative of a ruptured intervertebral disc and that the osteoarthritic changes are secondary to it. This hypothesis is inconceivable to us when it is evident from the x-ray that the bone changes have been present for a much longer time than the symptoms of the herniated disc. In addition these changes are bilateral and multiple in most cases. Narrowing of the intervertebral discs occurs in the thoracic and lumbar spine frequently without any evidence of a herniation of the nucleus pulposus. This finding is evident at operation. It is our feeling that the injury which produces the damage to the intervertebral disc also injures the joint ligamentous structure. The marginal changes such as spurring and lipping follow this injury the same as they do in any other joint. The injury does weaken the joint ligaments sufficiently to allow a herniation of the nucleus but this occurs late and will produce symptoms immediately. If the large osteophytes have already largely obliterated the foramen even a very small herniation will be sufficient to produce or markedly increase the symptoms and findings.

The diagnosis of pain in the region of the shoulder and upper extremity secondary to degenerative changes in the cervical spine does not often present any serious problem. These changes are usually diffuse and will involve more than one nerve segment, including both the anterior and posterior divisions of each root. The pain distribution will always correspond to the nerve root that has been compressed or irritated. The pain is usually not too severe unless it is complicated by a herniated nucleus pulposus. In such cases the pain is more severe and there are usually sensory changes, muscle weakness, and often muscle atrophy. The age incidence is usually over 40 years—our cases averaged 51.7 years. Novocain injection into the involved nerve just after its exit from the foramen or into the trigger point area will help localize the lesion. The scalenus anticus syndrome may cause some confusion at times. The pain is practically always limited to the ring and little fingers and indicates irritation of the last cervical and first thoracic nerves. The outstanding findings in these cases are neurovascular. For this reason the symptoms are more diffuse and are aggravated by the use of the hand with the arm elevated. The age incidence is usually lower and degenerative changes in the cervical spine absent. The Adson test should be positive in all of these cases.

Conservative treatment has given very satisfactory results in our cases. The milder cases have responded well to daily heat, massage and head stretching with a Sayre sling. It has been found to be important to increase the stretching as the tolerance will permit.

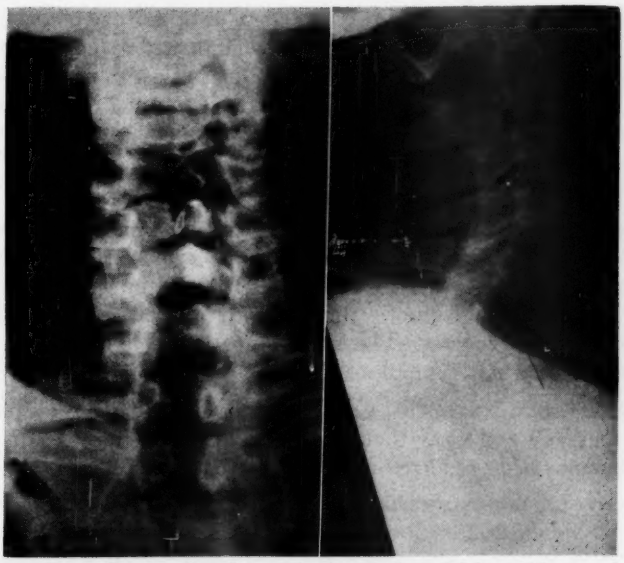

Fig. 6. Shows degenerative changes in the apophyseal joints with osteophyte formation.

Night traction may be required in some of the cases. The severe cases usually require continuous traction in bed until the acute symptoms subside. Then it is necessary for them to wear a collar for several weeks. Keeping the head in a neutral position during sleep will relieve most of the night pain. The so-called contour pillow as described by Jackson has been very useful in maintaining the position. X-ray therapy has been of value in the acute flare-up of old cases when there has not been any recent injury. We have not found it necessary to resort to surgery in any of our cases. One patient was operated on elsewhere but with very little improvement. The reports in the literature on surgery for ruptured discs in this area have been few and the series small. However, an analysis of these does reveal that the results from surgery are not much better than from conservative measures. We feel, therefore, that surgery should be reserved for those cases in which the symptoms are intractable and have not responded to a rigid conservative regime.

Summary and Conclusions

A review of the literature has been made on the degenerative arthritic changes in the cervical spine with associated nerve root pain. This has been followed by an analysis of 123 consecutive cases of cervical nerve root pain. Seventy-eight of these had the pain referred to the shoulder girdle area or upper extremity. Sixty-six of this group presented degenerative arthritic changes below the fourth cervical interspace. Seven of the sixty-six cases presented symptoms and findings definite enough to warrant a diagnosis of a ruptured intervertebral disc.

Occasional mild symptoms had existed for years in most cases, but usually a mild injury precipitated the nerve root pain. It is our feeling that the bone changes with constriction of the intervertebral foramina had existed for a long time. Then following trauma, edema of any or all of the soft tissues, including the nerve root, passing through the foramina would be sufficient to irritate or compress the nerve root. This occurs most often in the absence of a herniation of a nucleus pulposus.

Conservative treatment, such as traction, good sleeping posture, heat, massage and x-ray therapy, has given very good results. Surgery has not been required in any of the cases.

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UROLOGIC ASPECTS OF EXCISION OF THE RECTUM

One of the most troublesome complications following resections of the rectum is urinary retention. The occurrence of this difficulty is considerably higher than in surgery performed above the pelvis. In a review of 265 cases involving operations on the large bowel most of which were for malignancy the incidence of postoperative retention of urine was 27 per cent (Marshall et al). Of this latter number 9 per cent persisted three months or longer and 4.1 per cent required surgical relief. Perineal surgery seemed to be the main factor in precipitating the retention.

The etiology of the inability to void is little understood. The influence of the trauma from surgery, injury to the parasympathetic innervation to the bladder detrusor and loss of the mechanical support posterior to the bladder have all been considered. Evidence points to both mechanical and nervous factors as the responsible agents. Whatever the cause may be there results an imbalance between the power of the detrusor muscle of the bladder to expel the urine and the ability of the external sphincter simultaneously to relax. The majority of male patients are in the age group where mechanical obstruction from enlargement of the prostate either exists or is potentially present prior to the surgery on the rectum. This factor is superimposed as an additional etiologic agent on the aforementioned possible causes.

It is a customary and accepted procedure in abdominoperineal resections to insert an inlying catheter immediately postoperatively. Following removal of the catheter the majority of patients will have slight or no difficulty voiding. A large majority will suffer from complete retention. Of this latter group about one third will recover the function of voiding in about three weeks. During this time properly supervised tidal drainage is the choice method of treatment. Those who do not recover ultimately require urologic surgery for relief. It is the practice of some urologists to wait three to four months before proceeding with definitive therapy. This period of time permits recovery from the surgery of the rectum and may prevent unnecessary urologic surgery in the event that bladder function is restored. In the interim the patient is in such a sad plight battling with both colostomy and catheter drainage that discouragement and lowered morale prevail. Because of the consideration of this predicament and the highly successful results of weakening the bladder neck by transurethral resection, Emmett recommends this procedure soon after the third week. In general the weakening of the sphincter by transurethral resection is productive of satisfactory ability to void. Marshall et al suggested an interesting theory of therapy. By making pressure with the fist in the perineum thus substituting the posterior support of the bladder for that removed at surgery, three of his patients were able to void successfully.

Inasmuch as the incidence of retention of urine is a common complication following excision of the rectum it is recommended that each patient have an urologic appraisal prior to surgery on the rectum. Once the latter viscus has been removed the prostate cannot be evaluated by digital palpation. When thorough investigation has established the urologic status, one is in a much more favorable position to plan therapy should retention of urine develop.

CHARLES RIESER, M.D.

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The editors do not, however, agree to review all books that have been submitted without solicitation.*

OPERATIVE SURGERY. Edited by ALEXANDER MILES, M.D., LL.D., F.I.C.S. (ED), and Sir James Learmonth, K.C.V.O., C.B.E., Ch.M., F.I.C.S. (ED). Third Edition. 559 pages, with 235 illustrations. Price, $6.50. London, New York and Ontario: Geoffray Cumberlege, Oxford University Press, 1950.

In this, the third edition of this book which was first printed in 1933, the authors have tried to meet requirements of senior medical students and internes who are engaged in surgical work. There have been various changes in the different editions, a chapter on the choice on anesthetics has been added, and the chapter on technics of abdominal surgery has been recast and considerably amplified. The list of contributors is impressive, all of them being from the British Isles, many of them having international reputation.

In general the chapters are written according to the same outline. There is an outline of the anatomy given briefly, followed by a discussion, in a rather general way, of the operative procedure. The description of the operation in some instances is quite detailed, while in others details are skipped over rather lightly. Likewise, in some places the postoperative care is discussed briefly, while in others it is completely ignored.

The binding of the book is rather shoddy: one has the feeling that it must be handled with great care or the cover may come off. The paper is fair, the printing clear. The printing in the sections on anatomy is quite small; the illustrations are very good. We feel that the title of the book should really be, "A Primer of Operative Surgery," yet there are many pearls of knowledge within its covers.

A. H. LETTON, M.D.

RESUSCITATION AND ANESTHESIA FOR WOUNDED MEN. By HENRY K. BEECHER, A.M., M.D. 179 pages, with 58 illustrations. Price, $5.50. Springfield, Illinois: Charles C Thomas, Publisher, 1949.

This is a monograph founded mainly on the author's experiences during the North African and Italian campaigns of World War II. In general the book is divided into four sections. The first section is begun by showing the difference by case histories of two patients early in the North African campaign and then later on in the Italian campaign. The author remarks that two years and many a medical tour de force are spanned by the two cases. The major difference in the treatment of the two is the replacement of lost blood and the bringing of the preoperative blood volume to normal, thus doing away with secondary shock. In comparing the hospital statistics of Field Hospital 127 in 1918, and Field Hospital 33 in 1943, it is noted that in 1918 16 per cent of the individuals were never considered to be ready for surgery while in 1943, finally all were able to be operated upon. The author deals with the emotional problems of the soldiers and physician and how the Chaplain fits into the picture, how pain and other distress, as well as thirst, caused their toll of shock in the injured. A discussion is made of the type of injury, the time from injury till treatment, the type transportation, etc., causing various degrees of shock, and study of electrocardiogram during shock is discussed.

Section two deals mainly with the physiologic derangements of the wounded

found on hospital admission. This includes the chemical determinations of plasma protein, inadequate hemoglobin, and relationship between blood loss and type of wound is shown statistically that the severity of shock and the percentage of hemoglobin lost is directly proportional, and that the injuries of the extremities cause the most extreme loss of blood and shock. Other biochemical changes were encountered such as the N.P.N., the electrolytes, bilirubin, blood sugars; how they changed during shock. The author notes that if there has been a rise in bromsulfalein retention the patient's course is usually bad whereas if there is a gradual drop in the bromsulfalein retention, the course is good. Likewise the rise in uric acid at times indicates a bad course and a drop or level curve of uric acid shows a good course. A rise in the bilirubin by van den Bergh was found in patients who did badly postoperatively while a more or less level curve was found in patients who did well postoperatively.

The third section, on treatment of the wounded man, discusses first the use of morphine and how, during shock, the morphine which is given subcutaneously or intramuscularly is not absorbed, but after the patient is resuscitated with plasma and the blood pressure is raised, then all of the morphine is immediately absorbed into the blood stream, causing overdosage. Therefore, one of the contraindications to the use of morphine subcutaneously is shock, whereas to give morphine intravenously is not contraindicated. The author stresses the use of sedatives and says, "When the wounded men need hypnotics of the barbiturate type as well as narcotics, small doses of both types of agent will accomplish what large doses of either alone fail to do."

A section is then devoted to the setting up of shock wards and the treatment of shock by plasma, blood, and serum albumin. The fourth section is devoted to anesthesia of the wounded. Each type of anesthesia is discussed separately and here again, as we often see in many individuals, the personal choice of anesthesia plays a great part in the anesthetist's feelings about the whole thing. The author states rather categorically against much use of pentothal except in very short cases or as an inductor. We feel, however, that it is due to our greater experience with the drug and had the author had opportunity to use more pentothal, he would have probably liked it better. Again the old axiom that there is much more to anesthesia than the drug used, meaning the art with which any anesthetic agent is administered by the anesthetist.

The book on the whole is quite useful to the military surgeon, it is of interest to those who had many similar experiences during the last war, and because of the severe injuries that come into the general hospitals due to automobile wrecks and other disasters, the principles set down here are quite useful. The book, therefore, should find its way into the hands of those surgeons who do traumatic surgery and the resident staffs of general hospitals operating emergency wards.

A. H. LETTON, M.D.

CHONDROSIS IN ARTERIOSCLEROSIS OF THE LOWER EXTREMITIES. By EDWARD A. EDWARDS, M.D. 74 pages. Price, $2.00. Springfield, Illinois: Charles C Thomas, Publisher, 1950.

This is publication number forty-one of the American Lecture Series, edited by Irving H. Page, M.D., and A. C. Corcoran, M.D., as published by Charles C Thomas.

This is a very nice monograph. The writing is straightforward, the illustrations are sufficient, they are plainly understandable. The author has written

this book realizing that the arteriosclerotic individual usually escapes disability or gangrene until some thrombosis occurs in the diseased arteries and as physicians and patients take more pains in preventing injury to the ischemic limbs, thrombosis, secondary to such injury, becomes correspondingly infrequent. Thus, there is an increase in proportionate gangrene caused by spontaneous thrombosis in these vessels. He states, "No special instruments or laboratory procedures are required to make the diagnosis" of gangrene caused by spontaneous thrombosis. The first portion of the monograph deals with the theoretical and didactic consideration, whereas the second portion is a tabulation of the case supports, each case demonstrating some particular type of lesion. The first chapter deals with the etiology and pathology. Thrombosis may be caused by changing in the vessel wall, slowing of the blood stream, or alteration of the character of the blood and thrombosis may take place spontaneously or in relation to an injury to a limb. Spontaneous thrombosis may be due to an increase in size of an atheroma, as well as the slowing of the blood stream in the arterial wall, it also may be due to a rupture of the atheroma which allows the blood to come in contact with the interior of the atheroma tissue.

Chapter two deals with the clinical picture and states that suddenness of onset is characteristic of symptoms of thrombosis, intermittent claudication may or may not have been present prior to the present illness. The signs of the thrombosis are usually local, however a severe pain may have caused lack of sleep and appetite so that the patient looks fatigued and haggard and sometimes dehydrated. The important local findings include the characteristic tender non-pulsating artery, signs of severe ischemia, and a slight blue discoloration of the foot is seen in extreme interruption of the blood flow and this may be an indication of approaching gangrene. The author states that, "If the patient can be carried through this critical period without mishap, his limb is ordinarily saved, unless another attack occurs." In the diagnosis, the thrombosis of the artery should be differentiated from thrombosis of the deep vein and from cerebral vascular accidents as well as embolism.

"Treatment, the prophylaxis of spontaneous thrombosis, is the prophylaxis of the arteriosclerotic state, about which little is certain." The greatest prophylaxis in the arteriosclerotic state is the increase in circulation which does give some protection against thrombosis. Lumbar sympathectomy is quite helpful in attaining this. After thrombosis has become established, the alleviation of the ischemia and prevention of gangrene is an important step, followed by the prevention propagation of the thrombus. The lumbar sympathectomy should be tried even if the paravertebral sympathetic injection isn't entirely satisfactory. It is interesting to note that this is the opinion of Ochsner in a recent article. The operation can be easily carried out through an extraperineal approach followed by heparinization. The author warns against the use of heat and is not in favor of the use of application of ice unless the foot is to be lost. It is well to note that paravertebral injections should not be used when anticoagulants are administered. Berger's exercises may be found of use while the intermittent venus compression probably should not be used. The author prefers tyrohricin solution (0.5 mg. per c.c.) as a wet dressing for the dry gangrene. If the pain is not relieved by mild sedatives, it indicates advancing infection. "Advancing infection and pulmonary embolism are constant threats to conservative management." Refrigeration of the limb is useful in controlling infection and pain.

Chapter four is a collection of case reports illustrating spontaneous thrombosis while chapter five has case reports illustrating thrombosis secondary to tissue injury.

This is an excellent monograph on vascular thromboses and should be of interest to all surgeons for it is a problem which has long menaced all of us.

A. H. LETTON, M.D.

THE CYTOLOGIC DIAGNOSIS OF CANCER. By the STAFF OF THE VINCENT MEMORIAL HOSPITAL, Boston, Mass. 229 pages. Philadelphia: W. B. Saunders Company, 1950.

This volume, which is devoted entirely to the cytologic diagnosis of malignancy, is based on the experience of the staff of the Vincent Memorial Laboratory who have used this method since 1942. During these years, 7,700 cases have been studied by vaginal smears, sputum or bronchial aspirations, urine sedimentation, by gastric secretion and sediment of serous fluids. With this background, the book is written as a guide for those interested in the actual interpretation of smears and not from a clinical viewpoint. The general format of each chapter is essentially the same, beginning with histologic section of the tissue under discussion, which is followed by a black and white photomicrograph and a colored drawing of the classical desquamated cells. The different variations are described on the following pages. The first few pages of each chapter deal with the normal cells of the membrane under consideration. The cells are described in detail showing the different variations with the differences in nuclear size and changes as well as the protoplasmic changes. The first portion of the volume deals with the cells, both benign and malignant, as found in the vaginal secretions indicating conditions of the vagina, cervix and endometrium. The next forty pages deal with the cells of the respiratory tract, followed by two chapters on cells coming from the stomach and then two chapters on each, the urinary tract and cells found in the peritoneal fluid. The book is ended by a chapter on the technic of preparation of the smears with a very good index.

This is apparently an excellent volume for those who are primarily interested in the actual interpretation of smears. The binding of this book is quite good, the paper is excellent, the printing is good, and the drawings and photographs are of the highest quality. All in all, this is an excellent book which is dedicated to George M. Papanicolaou because of his pioneer work in the field of exfoliative cytology.

A. H. LETTON, M.D.

SURGICAL TREATMENT FOR ABNORMALITIES OF THE HEART AND GREAT VESSELS. By ROBERT E. GROSS, M.D. 72 pages. Price, $2.00. Springfield, Illinois: Charles C Thomas, Publisher, 1950.

This is a monograph which is for the most part the Beaumont lecture of the Wayne County Medical Society in Detroit, Michigan, which was delivered in 1945 by Dr. Gross. It is now being published as Number Three in the American Lecture Series of Surgery as issued by Charles C Thomas, Publisher. The author begins the abnormalities of the heart and great vessels by speaking of the patent ductus arteriosus which he covers very thoroughly. The writing is quite didactic, yet it is simply and interestingly written. Each point is clearly and emphatically brought out.

The monograph also deals with the defects of the pericardium, the tetralogy of Fallot, the right aortic arch, the double aortic arch, the anomalous right subclavian artery, then finally coarctation of the aorta.

The illustrations are quite good. This is the type of literature that does not tell the surgeon who has never done this type of operation what to do, but

lets you know what others can do so that one might be able to have his patients taken care of in a manner which they need. It is of value to the pediatrician, general surgeon, the medical man, as well as the vascular surgeon. It brings us up to date on the thinking of the majority of the vascular surgeons concerning these abnormalities. Dr. Gross has done a very good job with this issue.

A. H. LETTON, M.D.

WATER AND SALT DEPLETION. By H. L. MARRIOTTE, C.B.E., M.D., F.R.C.D., Middlesex Hospital, London, England. 80 pages. Price, $2.00. Springfield, Illinois: Charles C Thomas, Publisher, 1950.

This is another monograph in the American Lecture Series in Physiology, edited by Robert F. Pitts, M.D. The author has received a singular honor in view of his being an Englishman, yet being asked to publish this monograph in the American Lectures on Physiology. It is well to note that he is a physician and not a physiologist and that the book deals with the clinical side of the picture rather than stress the physiologic side of water and salt depletion. This monograph was first delivered in the Cronnin lectures held at the College of Physicians in London. The book is well written and easily understandable, the illustrations are good, the arrangements are quite orderly, taking first the theoretical and then the clinical side. This book should find a position in the libraries of all surgeons and medical men for it deals with the problems that they meet every day, and it should be studied by all residents and interns as well as by medical students. We feel that the only omission is the further discussion of oliguria. Otherwise the work is quite complete.

A. H. LETTON, M.D.

ABSTRACTS FROM CURRENT LITERATURE

PANCREATIC CYSTS SIMULATING CARCINOMA OF THE HEAD OF THE PANCREAS. *California Med. 72*:176-178 (March) 1950.

With many of the technical problems of the resection of the pancreas and duodenum for carcinoma of the head of the pancreas solved, the main difficulty confronting the surgeon at the present time is one of early differential diagnosis. This usually stops with differential diagnosis of obstructive and non-obstructive jaundice but, unfortunately, other conditions simulate carcinoma of the head of the pancreas by producing complete obstruction of the lower end of the common bile duct. An impacted stone surrounded by edematous reaction may produce this. Inflammatory lesions of the head of the pancreas may produce common duct obstruction and are indistinguishable grossly, and often with frozen section, from carcinoma of the pancreas. The authors report two cases of benign cysts of the head of the pancreas which simulated carcinoma.

The first case is that of a 40 year old male who had had right subcostal pain radiating to the back and jaundice of eight weeks' duration. Results of laboratory tests indicated that the jaundice was of the obstructive type. The second case was also a male, aged 42 years, who complained of progressive jaundice, severe pruritis and weight loss over a period of three weeks. Laboratory tests indicated obstruction in this patient also. Both were treated by radical partial pancreaticoduodenectomy, one in a single stage operation and the other in two stages. Both patients recovered uneventfully and are living and well. In one case the cyst was inflammatory in nature and in the other was apparently obstructive in origin.

The authors feel, in retrospect, that the clinical histories might have indicated the true nature of the disease and that the diagnosis of carcinoma of the head of the pancreas was probably unwarranted. Experience has shown, however, that the clinical history cannot be definitely relied upon and that in both of these cases the condition of the head of the pancreas was such as to be grossly indistinguishable from malignancy even at operation.

R. H. S.

PATHOLOGY OF CERTAIN INFLAMMATORY LESIONS AND NEOPLASMS OF THE SMALL BOWEL. William H. Harris, Jr., *New Orleans M. & S. J. 102*:340-347 (Jan.) 1950.

In presenting the gross pathologic appearance of certain inflammatory and neoplastic lesions of the small intestine, the author has included a discussion of pathogenesis where it contributes to better visualization of the gross lesion. Certain deficiency diseases as well as certain conditions resulting from the occlusion of the mesenteric vessels are included.

Though bacillary dysentery characteristically affects the cecum or rectosigmoid in most instances, the small intestine, particularly the ileum, is also involved in the majority of cases. Multiple small ulcers, which may coalesce and form larger ones but which are characteristically superficial, are observed upon inspection of the affected mucosa. In about half the cases, a pseudodiphtheritic membrane is present.

Tuberculous enteritis is characterized by ulcers which are irregular and roughly transverse ("girdle ulcers") which are easily distinguishable from the

ulcers of typhoid enteritis which, due to the involvement of Peyer's patches, have their long axis parallel to the long axis of the bowel.

Of 230 cases of syphilis in infants who came to autopsy, 1.3 per cent exhibited intestinal involvement. The most common lesion is a raised plaque-like band encircling the bowel. Ulceration and perforation with peritonitis may occur. In acquired syphilis these are rare but do occur. They may be annular raised lesions or may be clean, punched out, granulating ulcers. Gummas of the intestinal wall may occur.

In the abdominal type of actinomycosis, there is extensive fibrosis of the bowel wall which occurs most often in the ileocecal region. Numerous abscesses and fistulous tracts develop. In certain cases, the diagnosis is established at laparotomy for suspected appendicitis.

In general, the actual lesions produced by parasitic helminths are minimal but infestation with strongyloides is an exception since severe damage to the mucosa with sloughing and ulceration may occur. The mucosa appears swollen, red and soft.

The variable degree of inflammation throughout the gastrointestinal tract seen in advanced pellagra contrasts with the atrophy of the mucosa of sprue. Regional enteritis involves the terminal ileum in about 85 per cent of the cases but may involve any area from the jejunum to the sigmoid with "skipped areas." Grossly the involved segment is greatly thickened, heavy, leathery and the lumen is narrowed. The mucosa is thickened and ulcerated. Linear folds of the mucosa and linear ulcers are common. The mesentery is thick and indurated and the mesenteric nodes are enlarged. In a brief discussion of the etiology, the author favors the theory that previous involvement of the mesenteric lymph nodes with blockage of the lymphatic drainage may be the initial occurrence rather than the lymphadenitis being a result of the inflammation.

Though duodenal diverticulae are not common clinically, the postmortem injection of the duodenum with plaster of paris, Adkerman has found 14 diverticulae in 11 of 50 cases. They were almost equally distributed in the second, third and fourth parts of the duodenum. Rarely they may become inflamed, gangrenous or undergo perforation but usually they are asymptomatic. Aside from Meckel's diverticulum, rare diverticulae occur in the jejunum and ileum, particularly in the upper jejunum. Meckel's diverticulum is present in about 1 to 4 per cent of all persons. They may contain heterotopic gastric mucosa, pancreatic tissue of carcinoids may develop. Ulceration may develop in the aberrant gastric mucosa. About half of such ulcers eventually perforate making excision of such lesions imperative as soon as they are suspected. In addition, acute inflammation of Meckel's diverticulum may occur.

Ulcers (primary) of the jejunum have been reported but are rare.

In considering lesions associated with occlusion of the mesenteric vessels, the author briefly discusses mesenteric thrombosis and mesenteric infarction. Intussusception and volvulus are mentioned.

Of the benign neoplasms, heterotopias, benign epithelial tumors, benign mesenchymal tumors (chiefly the submucosal and subserosal leiomyomas) are briefly considered. Carcinoids (agreed to be derived from the argentaffine cells of Nicolas-Kulschitsky) have been found by Porter and Whelan in from 0.2 to 0.5 per cent of appendices removed surgically and it is estimated that the incidence of these tumors in the small bowel are more likely to show metastasis than those of the appendix.

Nickerson and Williams have found that carcinoma of the small intestine make up about 2 per cent of all carcinomas of the gastrointestinal tract, somewhat more than half of these being primary in the duodenum. Grossly they may be fungating, ulcerating or infiltrating (annular). Microscopically they are usually adenocarcinomas. In regard to those near the ampulla of Vater, it is usually impossible to determine if the primary site is within the small bowel because by time they reach operation, they have extended to involve all the neighboring structures. Carcinomas may arise in a Meckel's diverticulum. Sarcomas of the small intestine occur even less frequently than carcinomas. They may be leiomyosarcomas which present a localized mass on the intestinal wall and which seldom metastasize even when histologically malignant or they may be lymphosarcomas which are characterized by diffuse regional infiltration of the intestinal wall with grayish-white friable tissue. At times they may occur as isolated lesions without involvement of any other tissue in the body and thus present the possibility of cure by surgery.

R. H. S.

REFRACTORY ALKALOSIS AND THE POTASSIUM ION IN SURGICAL PATIENTS. Russel M. Nelson; Stanley R. Friesen and Arnold J. Kremen, *Surgery* 27:26-40 (Jan.) 1950.

A 30 year old woman, who was admitted to the hospital in a depleted state due to vomiting which had begun six weeks earlier following the delivery of a normal baby, exhibited on admission, carpopedal spasms which responded to the intravenous administration of calcium. Alkalosis was proved by a serum bicarbonate level of 35 milliequivalents. The alkalosis was refractory to the administration of saline intravenously and after 40 days in the hospital, a critical review of the case brought out the fact that the patient had been maintained exclusively with parenteral solutions of sodium chloride, glucose and amigen together with small amounts contained in amigen and blood. A serum potassium determination at that time revealed one of the lowest levels ever reported in a human being, 0.98 meq. (the serum potassium had been 3.4 meq. nine days after admission). During the next fourteen days, a total of 81.5 grams of potassium chloride was administered intravenously before the hypokalemia was corrected. As high as 13 grams was given in a single day. The alkalosis cleared up promptly. Other changes noted as the serum potassium rose included a rise in the chloride content of the gastric juice, a fall in the chloride content of the urine and a disappearance of a mild jaundice which had been present.

After further preoperative preparation, a complete duodenal diaphragm was resected and the patient recovered without further untoward occurrences. A brief discussion of this entity is included.

Three other cases exhibiting refractory alkalosis associated with hypokalemia are included. A discussion of the electrocardiographic changes seen in hypokalemia is presented.

Just how frequently the syndrome of refractory alkalosis and hypokalemia occurs in surgical patients is difficult to determine since little attention has been given to the problem. "The recognition and importance of potassium deficiency in the surgical patient deserves further investigation, in the laboratory and at the bedside."

R. H. S.

ACUTE PANCREATITIS. Vinton E. Siler and John H. Wuslin, *J. A. M. A. 142*:78-84 (Jan. 14) 1950.

In a study of 111 admissions of 98 patients with acute pancreatitis at the Cincinnati General Hospital from 1941 to 1948, the authors have based their diagnosis on at least one of three points: 1) A consistent clinical history in conjunction with an elevated serum amylase level; 2) surgical observations and 3) postmortem examination. They recognize three types of the disease: a) acute interstitial (edematous) pancreatitis, the most common type; b) acute pancreatitis with hemorrhage and necrosis; and c) acute pancreatitis with suppuration or formation of pseudocyst.

The disease affects persons of all ages but the importance of pancreatitis as a disease of advanced age was illustrated by the fact that 16.2 per cent of the cases occurred in patients in the seventh decade. The higher incidence in females (58.6 per cent) may be related to the fact that associated disease of the gallbladder occurred twice as frequently among the females.

Careful evaluation of past histories revealed that a large percentage of patients had suffered previous mild attacks. Alcoholism was noted in only 8.1 per cent of the cases. Trauma was considered to be the precipitating factor in only one case. The termination of normal pregnancy immediately preceded the attack in four cases. This relationship is probably based on disease of the gallbladder. (Three of the cases exhibited x-ray evidence of gallbladder disease.) In only a few instances did the onset immediately follow the ingestion of food. Though in about ten per cent of the cases the first symptom was either nausea and vomiting or a vague indigestion, without exception all the cases came to experience the severe, characteristic pain.

On admission only about one-fourth of the patients had fever of 100.0 degrees or over. The pulse tended to be rapid in the severer cases. The blood pressure readings revealed hypertension more often than shock. Obesity was noted in over one-third of the cases. Jaundice was detected either clinically or by subsequent laboratory tests in 38.7 per cent. The cause of the jaundice could not be definitely settled since more than one-half of the patients gave evidence of coexisting gallbladder disease.

On abdominal exam, distention was frequently noted, and tenderness was present in every case except one. Rebound tenderness was present in somewhat less than half the cases. On several occasions, the upper abdomen was found to be rigid. An abdominal mass was palpated on admission or at subsequent exam in 27.1 per cent of the cases.

Laboratory examination revealed a leukocytosis in 83.8 per cent. The most reliable single test was the serum amylase test which showed a level of over 200 in 82 per cent of the cases. The urine contained albumen in one-third of the cases and in well over one-half of the more serious cases. Hyperglycemia was noted in only about 10 per cent and less than half of these suffered permanent diabetes.

In the majority of instances, emergency x-ray examination of the abdomen revealed nothing of significance but subsequent examination with contrast media was helpful in establishing an exact diagnosis. Graham Cole studies made after the acute symptoms and all traces of jaundice had subsided revealed normal function in only 17.1 per cent; 31.7 per cent had gallstones, and in the remaining 51.2 per cent, the gallbladder was not visualized or was considered to exhibit poor function.

A correct diagnosis was made on admission in only 46.8 per cent. The disease was noted to exhibit a tendency to afflict otherwise healthy persons. A coincidental peptic ulcer was noted in 6.3 per cent. Of the entire series, 18.9 per cent of the admissions were followed by recurrent attacks of pancreatitis.

The operative mortality for the entire series was 15.5 per cent and for the hemorrhagic-necrotic group, 60 per cent. A total of 45 operations were performed. Emergency operations were not undertaken in the face of an established diagnosis. The total mortality was lower (18 per cent) than usually reported in the past. Mortality for patients with interstitial pancreatitis was 4.8 per cent; with hemorrhage and necrosis, 84.7 per cent; and with suppuration or pseudocyst, 28.6 per cent.

Nonoperative treatment during the acute stage consisted of bed rest, sedation, nothing by mouth and replacement and nourishment by the parenteral route. Penicillin, which was employed in 28 cases, did not seem to influence the morbidity.

R. H. S.

THE ESOPHAGEAL ARTERIES. An Anatomical Study of 150 Specimens. La Vern L. Swigart; Robert G. Siekert; William C. Hambley, and Barry J. Anson, *Surg., Gynec. & Obst. 90*:234-243 (Feb.) 1950.

The advancement in esophageal surgery in recent years has prompted increased interest in the anatomy of the organ. The literature in the past contains little detailed information on the arterial pattern of the esophagus. In this study of 150 specimens obtained from the dissection laboratory, the authors have drawn the following conclusions:

"For the cervical portion of the esophagus, arteries originate from three segments of the inferior thyroid arteries. In the majority of cases, 1 esophageal artery arose from a segment, although 1 or 2 segments of the thyroid artery might give rise to an esophageal branch. Esophageal vessels arose from the terminal branches of the inferior thyroid artery more frequently (although small in caliber) than did similar vessels from the ascending and descending segments of the inferior thyroid artery. Those vessels which arose from the ascending segment descended a greater distance on the esophagus than did those vessels arising from the other two segments. Esophageal branches arose approximately as frequently from the ascending segment of the inferior thyroid artery as from the descending segment.

"For the thoracic portion of the esophagus, the left inferior bronchial artery gave rise to esophageal vessels more frequently than did the other bronchial arteries. Vessels of this origin descended on the esophagus and anastomosed with the first (proximal) esophageal artery of aortic origin in many instances. The superior right bronchial artery was the second most common bronchial source of esophageal arteries. The latter vessels usually ascended on the esophagus and a definite anastomosis with an esophageal branch of cervical origin could frequently be demonstrated. Usually 0 to 2 esophageal arteries arose directly from the thoracic aorta. In no specimen were there as many as 4 or 5 segmental branches derived from the aorta, contrary to statements made in textbooks of anatomy. The majority of vessels of segmental supply from the aorta occurred between the level of the seventh and ninth ribs or interspaces, inclusive. Rich intercostal arteries were the source of origin of esophageal arteries in one-fifth of the specimens studied; usually, one esophageal vessel originated from an intercostal artery. The fifth right intercostal

artery gave rise to esophageal arteries more frequently than did the other intercostal arteries.

"To the abdominal portion of the esophagus, the left gastric artery gave rise to esophageal arteries in all but eight specimens. Esophageal arteries in five of the eight cases arose from the accessory left hepatic artery. In approximately three-fourths of the specimens, one to three esophageal arteries originated from the left gastric artery. In slightly less than one-half of the cases, the left inferior phrenic artery gave supply to the esophagus, there usually being a single esophageal branch from this source. An esophageal artery originated from the right inferior phrenic artery in only five specimens.

"In general, it may be noted, the arterial supply of the three divisions of the esophagus is segmental in nature; the scheme of vascular supply resembles the segmental pattern of arteries sent to the foregut, midgut, and hindgut of the alimentary canal prior to growth, rotation and peritoneal fixation. As shown in this study, there are ascending and descending branches of esophageal vessels which course along the anterolateral or posterolateral aspects of the esophagus. A similar arterial pattern obtains in the large colon, common bile duct, and ureter; the scheme is segmental with ascending and descending branches along these tubular structures. The right, middle and left colic arteries, by means of ascending and descending branches, form an anastomotic channel which courses along the medial border of the bowel. From this parallel loop extramural and intramural branches are given off to the colon throughout the latter's extent. Were the rectum compared with the esophagus (both being extremities of the alimentary tract), close similarity would be apparent; and if the ends of the rectum were reversed, the inferior hemorrhoidal arteries with their branches would be comparable in size and anastomotic connections to the arteries of the cervical esophagus; the middle and superior hemorrhoidal arteries would be comparable, in the above respect, with the thoracic and abdominal portions of the esophagus, respectively."

R. H. S.

THE PSYCHOLOGY OF THE SURGICAL PATIENT. Alexander Kennedy, *Brit. M. J.* 396-400 (Feb. 18) 1950.

For the reason that temperament has at least as much to do with the choice of surgery as a profession as has technical aptitude, the human approach is sometimes less in evidence here than elsewhere. It is characteristic of a mature surgeon that his management of a case is based upon an understanding of human nature and through his understanding of all the factors that bear upon the case, pathological and psychological, he may obtain a better outcome and functional result than a junior colleague whose technic and theoretical knowledge are more polished than his own.

Of prime importance in reaching this state of maturity is learning to appreciate their patients' viewpoint. Few patients are able to understand the rationale of their treatment and this lack of comprehension must be replaced with confidence in those who are caring for them. He should be told in the simplest term what is being done to him and why and enough must be offered to counter the often justifiable claim "he doesn't tell you anything" but care must be taken not to convey dangerous or discomfiting knowledge. Though a major operation is a landmark in a patient's life, the surgical intricacies mean little to him except in terms of hours spent in the operating room or the length of the incision in his abdomen.

The average patient sometimes must tolerate minor psychological trauma during his stay in the hospital. Few patients suffer any effect from these instances but the psychological handling of the patient may make a great difference in the functional result.

In informing the patient about his illness, three main variables apply. These are his intelligence, the degree in which he is a realist, and the extent which he is prepared to entrust the details to the surgeon. The author feels that medical terminology must be used with care "lest it clash with the perverted nomenclature of hearsay and commerce." He considers the use of the word "chronic" particularly misleading.

In speaking to patients with a poor prognosis, two principles are important: 1) It is rarely possible to deceive a patient successfully for any length of time unless he half-consciously desires to be deceived, and 2) a prognosis which allows a faint ray of hope, however dim, is much better for the patient's morale than inactive pessimism which is rarely justified.

The subject of insomnia in the hospitalized patient is considered. The author emphasizes the importance of using sedatives to initiate a routine rather than to become a part of one. The problem of long-stay patients is presented and it is pointed out that the tendency which these cases have to become dependent to a child-like degree upon their attendants is to be discouraged from the start. The author feels that where a permanent disability is to be expected, there is no point in concealing a fact temporarily which must inevitably be realized.

In a discussion of the effect of drugs, it is pointed out that certain specifics have a marked depressant effect. These must be anticipated and counteracted. In regard to habituation to pain relieving drugs, the importance of the individual evaluation of the patient is stressed. In certain vulnerable personalities in whom pleasurable sensations as well as analgesia result, addiction may be established very rapidly.

The appearance of acute psychiatric states complicating surgical disease is common. The aged are especially susceptible to such conditions. Though these conditions are usually transient, the author feels that the appearance of mental symptoms is usually a signal for seeking expert assistance in this line. The experience and understanding of a conscientious house officer are invaluable in such emergency.

An understanding of the patient's motivation is often essential to the wise decision as to whether or not to leave certain conditions alone. For example, the patient who presents himself with a small varicocele may simply need reassurance that this condition does not affect his sexual functions. The motivations underlying a pathological desire to submit to an operation may not necessarily be buried deep in the subconscious. A prospective bridegroom may feel that an appendectomy is a small price to pay for a dreaded middle aisle march.

A discussion of functional disability, criminal malingering and the effects of negotiation for compensation are presented. The surgeon should familiarize himself with these practical aspects as they apply in the given case and if such a situation is developing, a show of firmness in regard to return to work, etc., is usually all that is necessary. It is emphasized that such things are not always wholly conscious actions.

In conclusion it is stated that "the purpose of this paper is to draw attention to the fact that modern surgery is a descendant of the Hippocratic art

and that 'it is the duty of the healer not only to do that which immediately behooves him, but to secure the cooperation of the patient, of those in atendance, and of all external agents'."

R. H. S.

CONGENITAL ANEURYSM OF SUPERIOR VENA CAVA. Report of One Case with Operative Correction. Osler A. Abbott, *Ann. Surg. 131*:259-263 (Feb.) 1950.

A 19 year old male college student, on routine x-ray examination of the chest, was discovered to have a large mass in the right upper mediastinum and was subjected to angiocardiography. A fusiform dilatation of the superior vena cava was detected. Examination of a chest film made two years earlier revealed that the mass had been present at that time but was of smaller size.

Since the exact nature of the mass could not be ascertained and since it appeared to be enlarging, exploratory thoracotomy was performed. A large aneurysm of the superior vena cava with smaller daughter aneurysm was found. The wall of the aneurysm was too thin to permit plication. The aneurysm was completely dissected free and was wrapped in polyethylene film which was sutured in place. The vena cava proximal to the lesion was protected with nonreactive cellophane and the phrenic nerve wrapped with a free pleural graft in the portion which might contact the polyethylene.

During the immediate postoperative period, the mass appeared to increase in size but on angiocardiographic examination six months after operation, the aneurysm had decreased markedly in size and a thickening of the wall was noted. A slight constriction of the vena cava just distal to the aneurysm did not appear to obstruct the flow of the contrast media into the heart.

The patient's activity was limited for three months following operation and he was not allowed to exercise strenuously for six months. He was able to continue with a full course in the university and has been asymptomatic.

Primary aneurysm of venous structures is very rare and the author has been unable to find a report of any similar case. In his opinion, the catheterization of the heart chambers in this case did not contribute to the diagnosis and seemed to confuse the issue. It is also felt that this procedure constituted a definite hazard because of the extreme thinness of the aneurysmal wall. It is emphasized that the polyethylene film employed should be prepared by boiling and not by soaking in alcohol since the alcohol might dissolve out the di-acetyl phosphate necessary to produce fibroblastic reaction.

R. H. S.

INTRASPINAL SEGMENTAL ALCOHOL BLOCK FOR RELIEF OF INTRACTABLE PAIN. A Preliminary Report. F. Paul Ansbro, *Am. J. Surg. 79*:276-281 (Feb.) 1950.

In the past, when alcohol has been injected into the spinal subarachnoid space, the difficulties encountered were due to the amount of alcohol employed and the haphazard way in which it was administered. Motor paralysis and loss of sphincter control were frequent. Occasionally damage to the vital centers resulted. Utilizing the tendency of intraspinal anesthetic agents to affect the sensory roots first when injected in small amounts, the author has devised a technic for the administration of minute amounts of alcohol at several levels. The method has been employed for the relief of intractable pain with uniformly good results in about 75 per cent of the cases.

Method: A 3.5 mm. Touhy catheter is introduced through a number 16 gauge Huner pointed needle inserted into the subarachnoid space in the lumbar region and advanced cephalad to the level of the desired segment as determined by previous measurement. The position is checked by roentgenogram. With the patient on his side (affected side uppermost) 0.5 to 1.0 minims of absolute alcohol is injected. The catheter is then withdrawn for a distance as measured on the roentgenogram (allowing 9 per cent for x-ray spread) to the next segment where the injection is repeated. Similar measurements and withdrawals are made for each segment. Five or six segments may be treated in one procedure. If the condition is bilateral, the opposite side may be treated after an interval of several days.

Twenty cases have been treated. These include cases of sciatica and post herpetic pain in the thoracic region as well as advanced malignancy cases. Three cases of intermittent claudication of vascular origin were included. Good results were obtained in 75 per cent. In the 25 per cent not helped by the procedure, no evidence of motor damage was seen. Subjective relief of pain was excellent in the 75 per cent benefited by the procedure.

A case report illustrative of a typical problem and the method employed is included. In one case a unilateral sympathetic paralysis affecting the lower extremity was noted and persisted for over a month. The author feels that if the technic described is used and the dosage is limited as outlined, no harmful effects result from the procedure.

R. H. S.

ANTICOAGULANT THERAPY IN SURGERY. Geza de Takats, *J. A. M. A. 142*:527-534 (Feb. 25) 1950.

In this presentation, the author limits himself to his personal observations during the past 10 years at St. Luke's Hospital, Chicago. In regard to heparin tolerance, he refers to his previously reported work with a series of 97 normal subjects. Of this number, 46 were hyporeactors, 20 were mean reactors, and 31 were hyperreactors. He has not found this high percentage of hyperreactors to hold true in patient material and explains this discrepancy on the basis of the observation that heparin response decreases with advancing age.

While noting the recently developed tests for heparin tolerance, the writer has continued to use the capillary coagulation time since it is a true bedside test. Though the response to heparin seems to be characteristic of the individual, a number of factors are known to modify its action in the patient. He lists the following factors as some of those which were investigated in his clinic:

Decreased Response—Age, acute thrombosis, postoperative state, dehydration, hemoconcentration, polycythemia, hyperlipemia, carcinomatosis, digitalis, epinephrine.

Increased Response—Youth, traumatic or hemorrhagic shock, hepatic damage, neostigmine, sodium terathionate, dicoumarol, caronamide.

Of the various methods of administration of heparin, the author finds intermittent intramuscular (deep subcutaneous) injection to be highly satisfactory, particularly if preceded by intravenous priming with heparin. He feels that intramuscular injection of slow-acting heparin (Petkin's menstruum, etc.) should be reserved for prophylactic use and not in therapy.

In regard to dicoumarol, it is pointed out that though it effectively reduces the prothrombin level, the correlation between a safe level and hemorrhagic complication is poor.

Since no safe anticoagulant for oral administration exists as yet, treatment with intramuscular heparin offers the best solution at present. The author sets forth a plea for simple, standardized methods in anticoagulant therapy. A detailed description of dosage, etc., in various conditions as employed in the author's clinic is included.

R. H. S.

SOUTHEASTERN SURGICAL CONGRESS

Sectional Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., July 13-15, 1950

Preliminary program for the meeting of the District of Columbia, Maryland, Virginia and West Virginia Sections, Southeastern Surgical Congress. Suitable prizes for those participating in the gold tournament will be awarded to winners on the evening of the banquet.

July 13, Thursday

Presiding, Dr. Everett L. Gage, chairman, W. Va. Section

Invocation—Rev. Lloyd Courtney, D.D., pastor, Old Stone Presbyterian Church, Lewisburg, W. Va.

Address of Welcome—Dr. Andrew E. Amick, past-president, W. Va. State Medical Association, member council, Southern Med. Assn.

Presiding, Dr. Harry Lee Claud, chairman, D. of C. Section

Address—Dr. W. Raymond McKenzie, Baltimore, Md., "Nasal Fractures"

Address—Dr. Donald Stubbs, D. of C., "Control of Pain by Intravenous Narcotics, Nerve Block or Ethel Chloride Spray"

Address—Dr. J. M. Emmett, Clifton Forge, Va., "Gastric Surgery"

Address—Dr. M. L. White, Jr., Huntington, W. Va., "Surgical Treatment of Lung Abscesses"

July 14, Friday

Presiding, Dr. Waverly R. Payne, chairman, Virginia Section

Address—Dr. C. C. Howard, Glasgow, Ky., president, Southeastern Surgical Congress, "Open Reduction of Fractures"—with lantern slides

Address—Dr. J. O. Rankin, Wheeling, W. Va., "Duodenal Obstruction in the Newborn"

Address—Dr. Amos R. Koontz, Baltimore, Md., "Tantalum Mesh in the Repair of Ventral and Inguinal Hernia"

Discussant—Dr. Francis L. Coffey, Huntington, W. Va.

Address—Dr. Frank S. Johns, Richmond, Va., "Diseases of the Gallbladder" (exact title announced later)

Discussant—Dr. T. Kerr Laird, Montgomery, W. Va.

July 15, Saturday

Presiding, Dr. McKenzie, Baltimore, Md.

Address—Dr. O. S. Lloyd, Baltimore, Md., "Treatment of Fractures of the Hip with a New Type of Adjustable Lag Screw Bolt"

Discussant—Dr. Dean L. Hosmer, Bluefield, W. Va.

Address—Dr. Charles A. Hoffman, Huntington, W. Va. (urological paper with title to be announced later)

Address—Drs. Herbert Schoenfeld and Aubrey O. Hampton, Washington, D. C., "The Diagnosis and Treatment of Massive Upper Gastro-Intestinal Lesions" (Dr. Schoenfeld will deal with the treatment, Dr. Hampton with the diagnosis)

Discussant—Dr. E. W. Squire, Charleston, W. Va.

Address—Dr. Richard A. Michaux, Richmond, Va., "Evaluation of Cytologic Studies in the Early Diagnosis of Cancer"

Discussant—Dr. Walter Putschar, Charleston, W. Va.

Hon. C. W. Strickling, Huntington, W. Va., attorney, will be the toastmaster for the banquet on Saturday evening. Hon. Rush D. Holt, Weston, W. Va., former United States Senator, will deliver the principal address on the subject, "Fable of the Free Lunch."

The Friday, July 14, noon hour is reserved for the business meetings of the four state sections. These meetings will be held separately.

Reservations should be made direct with the hotel management, and should be handled promptly, as July is one of the busiest months at The Greenbrier, and undoubtedly the hotel will be crowded.

For information, communicate with Mr. R. J. Wilkinson, Jr., Huntington, W. Va.